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THE ALASKA DIETARY SURVEY 1956-1961

Christine A. Heller, et al

Arctic Health Research Center
Anchorage, Alaska

1961

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The Alaska Dietary Survey

1956-1961

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INTRODUCTION

A. The diet of Eskimos has always been of interest because these people have managed to survive under adverse circumstances by utilization of unusual natural resources. Previous studies of Alaskan diets were limited to a series of weighed studies at Gambell and Anaktuvuk Pass by Rodahl(1); to a limited diet record study at Nikolski by Moorrees(2) and a study based on one-day diet records from four Eskimo villages by Heller(3).

B. The present study was begun in 1956 with the following objectives:

(1) To determine the present food habits of Alaskan Eskimos and Indians;

(2) To estimate the degree of their dependence on local food;

(3) To estimate the adequacy of the diet;

(4) To predict medical or public health problems which might arise from inadequate diet.

METHODS

Eleven villages—nine Eskimo and two Athapascan Indian—representing several geographic and ecologic areas of Alaska were included in this study (see map facing page 4). The combined total population of these villages was 2252.

A total of 4840 diet records, most of them of 7 days duration were collected on a seasonal basis for both sexes and for all age levels. From these records the data of 4567 were converted by machine calculation into mean daily intakes of the eleven major nutrients,* and the mean intakes were then compared to the National Research Council (NRC) recommendations(4) in order to assess the adequacy of the diet. The source of nutrients and seasonal fluctuations in these sources were determined as well. The remaining 273 diet records were of infants who obtained either part or all of their milk from the breast.

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* Calories, protein, fat, carbohydrate, calcium, iron, vitamin A, thiamin, riboflavin, niacin and ascorbic acid.

Eskimo woman acting as interpreter-helper recording food intakes, Shungnak.

During the initial visit to each of the selected villages, the nutritionist met first with the local village council to acquaint them with the purpose of the study, to explain the procedure to be used in obtaining diet records, and to secure their recommendations for the services of an interpreter-helper. During this, as well as subsequent visits, every occupied home in the village was visited and diet records obtained from all who would cooperate.

The majority of families were cooperative and much of the credit for the success of the project belongs to the participants.

In each family, one member, who could speak, read and write English, was given instructions on how to observe, measure (using typical household measures) and record the size of servings for each family member. The nutritionist with the interpreter's assistance checked daily to be sure that intake measurements were being made as accurately as possible. Size of dishes and utensils regularly used by a particular family member were noted and recorded.

The interpreter assisted the nutritionist in recording food intakes for those whose knowledge of English was limited. (see illustration no. 1)

Most of the diet records were collected during the nutritionist's two or three week visits to the village. A limited number of records, however, were kept by either a family member or the interpreter-helper in the interim between the nutritionist's visits and a small number of them consisted of weighed amounts.

Food values from Handbook 8 (1950)(5), Bowes and Church (1951)(6) as well as the results of the analysis of local foods by the Arctic Health Research Center and the U.S. Army Medical, Research and Nutrition Laboratory, Denver, Colorado, were used to convert food intakes into nutrient values. Recipes for common mixed food preparations were collected. The final nutritive values assigned them were average values of a series of recipes. Individual family recipes of uncommon food mixtures were also collected and converted to nutrient values.

Samples of the raw, edible portions of local foods as commonly prepared and consumed by Eskimos and Indians were collected for analysis. Moisture, protein, fat, fiber, ash, calcium, phosphorus and iron were determined by methods of the Association of Official Agricultural Chemists.(7) Vitamin A (Carr-Price), carotene (chromatography and spectrophotometry), thiamine (microbiological), riboflavin (microbiological), niacin (microbiological) and ascorbic acid (Roe and Kuether) were determined by methods of the Association of Vitamin Chemists.(8) The results are shown in Table 87, Appendix.

CHAPTER II

VILLAGE DESCRIPTIONS

NORTHCENTRAL ATHAPASCAN INDIAN

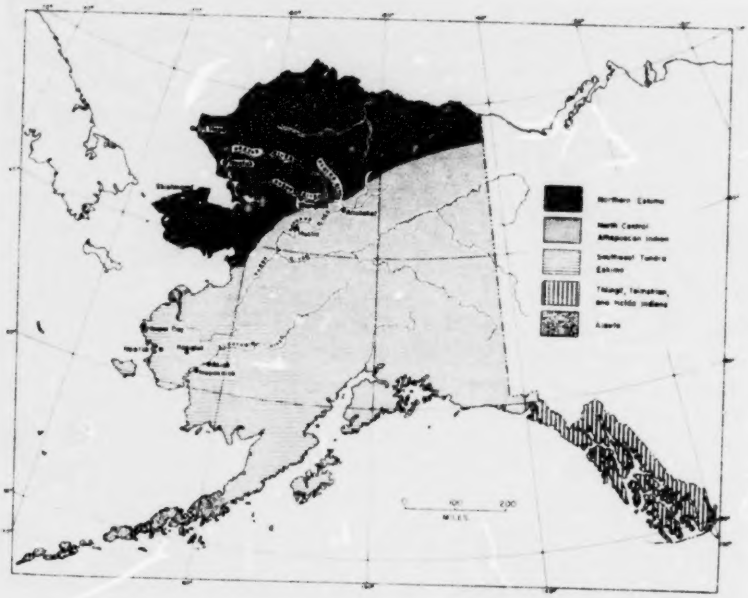
ALLAKAKET

Allakaket, an Athapascan Indian village, is located in northcentral Alaska just a few miles north of the Arctic Circle. It is situated on the banks of the Koyukuk River near its confluence with the Alatna River. Allakaket actually means "mouth of the Alatna". The village site was selected because of the good fishing for salmon, whitefish and ling cod.

While most of the inhabitants of Allakaket are Athapascan Indians, a few Eskimos, originally from the Kobuk and upper Alatna River areas, have also settled here. In the past the two groups remained distinct, but in recent years some intermarriages have occurred. The Kobuk Eskimos and Koyukuk Indians have had trade relations since long before the advent of the white man to the Arctic. The Indians sold various kinds of furs to the Kobuk Eskimos who traded them in turn to the coastal Eskimos at the annual summer rendezvous at Kotzebue Sound. In return Kobuk Eskimos traded to the Indians seal oil, ugruk rawhide and many other items obtained during their coastal sojourn.

The Koyukuk River Indians formerly ranged over a considerable area, moving their camps as dictated by seasonal hunting, fishing and trapping requirements, meeting only occasionally for "potlatch" celebrations. The first permanent settlement for the upriver group was at Arctic City, a fairly large village, seven or eight miles down river from the present village of Allakaket. Around 1907, one small group left Arctic City and established themselves at Allakaket, and later another group settled at Hughes and a third at Cutoff.

Allakaket is situated in a wooded area (spruce and birch), and the homes are, for the most part, one-room log structures. The village economy is still essentially one of hunting, fishing and trapping with the sale of beaver, mink and marten pelts the most important source of cash income. In the past year or two a few of the men have found summer employment outside the village. Seven men were thus employed during the summer of 1958. One man had four months and two men two months employment each at nearby gold mines; two men worked for two months each for


Northern Eskimo
North Central Athapascan Indian
Southwest Tundra Eskimo
Tlingit, Tsimshian, and Haida Indians
Aleuts
0 100 200
MILES

Map of Alaska showing areas inhabited by Eskimos and Indians and the location of the dietary study villages.

wages at Hughes and two men worked for one month each, fishing for a white man who has established himself in the Arctic. Welfare, mostly old age assistance, is available to a few individuals.

HUSLIA

The village of Huslia is situated on the banks of the Koyukuk River in northcentral Alaska. The village site is of recent origin, the people having moved to it from Cutoff less than 10 years ago. While Cutoff was located in an excellent trapping area (beaver, etc.), it was so frequently subjected to spring flooding that it was not considered a desirable place for the construction of schools and other permanent buildings. The present village site has its drawbacks, too. The men have had to extend the length of their trapping lines, sometimes up to 60 miles or more; also the Koyukuk River is constantly changing because of erosion along the bank, especially from the ice as it breaks up and goes out of the river in the spring and from the runoff from melting snow and ice. The village has already had to be moved back from the river several times. In fact, the original Huslia site is now under water in approximately the middle of the river.

Since Huslia is in an area wooded with spruce and birch, the homes are of log construction and fuel is plentiful. Most of the homes have two or three rooms.

Income is derived from two main sources (1) from the sale of pelts, mainly beaver and muskrat with some lynx, mink and marten, and (2) from summer wage work in nearby mines and on river boats.

The yearly food cycle for Huslia, except for minor differences, is the same as that for Allakaket and other Athapascan villages in the same general area. Moose is by far the most important source of meat, but considerable amounts of beaver, muskrat, and ptarmigan are also seasonally important. Salmon is also an important food; and lesser amounts of whitefish are available. Most of the dried product is used for dog feed.

Gardening is possible at Huslia but only for those staying at the village during the summer. Most of the able-bodied men leave for wage work and the women go to nearby camps where they devote much of their time to fishing and drying the catch.

NORTHERN ESKIMO

POINT HOPE

Point Hope is located on a gravel spit that projects about fifteen miles out from the northwest coast of Alaska into the Chukchi Sea. It is approximately 190 miles northwest of Kotzebue, and approximately 103 miles north of the Arctic Circle. The spit on which the village is located has been continuously occupied for at least 1000 years. The village, its people and environs have been thoroughly studied by Rainey(9), Larsen and Rainey(10) and Van Stone(11,12). About half of the houses are of frame construction and the rest are constructed of sod and whalebone; the latter are mostly one room affairs while several of the frame dwellings have two or three rooms.

Since it is necessary to protect the houses against the cold winds and gales that often blow across the spit many of the frame houses are banked along the sides with sod blocks. During the winter added protection is secured by building long entrance ways made either with sod blocks or discarded oil barrels with a top covering of heavy canvas or other material. These are necessary expedients since fuel is at a premium, there being no driftwood in the immediate vicinity. Seal blubber, the traditional fuel of the past, is occasionally used by some to obtain a quick, hot fire for cooking. Commercial fuel oil is used when families can afford it. Considerable heat is given off by the gasoline lanterns, the chief source of light in most homes during the long winters.

There are two stores in the village, a cooperative store with a manager appointed by the village council and one privately owned by a local Eskimo family.

Yearly cash income is variable for most families since it is derived primarily from summer wage work (construction jobs, mines, etc.). Only a few residents—a school janitor, the postmaster, the store manager—have year-round wage incomes.

The total estimated village income for 1958 according to the Bureau of Indian Affairs economic report[13] was as follows:

Sales of furs and hides	$ 622.10
Arts and crafts	7,295.40*
Wages, including private business	30,770.00
Direct welfare (OASI, ADC, etc.)	11,451.00
Unearned Income (Social Security, Unemployment insurance, etc.)	10,495.00
	$60,633.50

This amounts to an average income of $1318.00 per family per year.

At one time furs, especially those of the polar bear and arctic fox, provided a good source of cash income. But the current price for arctic fox fur does not now warrant the effort to secure it, and the number of polar bear taken by resident Eskimos has dwindled steadily since the influx of winter sport hunters seeking bear trophies and skins for rugs began. However, several new local Eskimo-owned businesses which provide food and lodging and dog team transportation for the hunters and other visitors, have developed and may eventually equal the income usually realized by the sale of skins.

Ivory and whale bone carving, the making of baleen baskets and skin sewing (parkas and mukluks) continue to be a modest but fairly constant source of village income.

In 1958 the sale of artifacts was an important source of income for many families; in 1963 such income was at a minimum, for many of the igloos at old Tigara, where most of the artifacts have been found in recent years, are now used as meat storage caches, and to protect these from being undermined the village council has curtailed artifact digging in the general area.

There is a National Guard unit at Point Hope which also provides a source of income.

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* This item includes arbitrary values placed on boats, sleds and skin garments used locally.

NOATAK

Noatak lies 70 miles north of the Arctic Circle on the banks of the Noatak River, approximately 50 miles due north of Kotzebue.

Noatak people have not been studied to the same degree as have the residents of Point Hope. For this reason it seemed desirable to inquire into the seasonal food quest patterns of past times as remembered by the village elders. This information is included in the appendix.

Present day Noatak people follow essentially the same pattern of hunting and fishing as in the past except that now most families live almost continuously in the village from the time school opens in September until it closes in May.

Most fall and winter fishing is done at the village location or at most only relatively short distances away from it. The women also do considerable berry picking in this general area and may obtain sizeable quantities of mashu, the edible root of *Hedysarum alpinum*, from rodent caches. From late fall and thoughout the winter the men, usually in small groups of 4 to 6, establish caribou hunting camps in the rolling hill country upriver from the village. They may be away from home for a few days or up to two weeks at a time depending on the movement of the caribou in the area. Occasionally an entire family may establish a hunting camp and carry on much as they did in the past but this is now uncommon.

Noatak residents still make traditional summer trips to the coast (Kotzebue Sound) where they stay from late May or early June to early September. Some families still go to Sealing Point; but most go directly to Sheshaulik. They still hunt for seal, ugruk, beluga whale, rabbits, and wildfowl; do some fishing and gather berries, but according to their own statements, not as assiduously as in the past. When the bulk of these activities is over, most families move to Kotzebue to trade, to visit friends and relatives and to engage in whatever wage work is available to them. Some families spend the entire summer at Kotzebue—usually those who are able to obtain summer wage employment in construction work as carpenters, day laborers or as deck hands on supply barges. Wage employment is unpredictable from year to year. The Bureau of Indian Affairs(13) estimate of income for the entire village for 1960 was $36,000.

Regular wages are obtained by very few families. They include a family engaged in year-round reindeer herding (they care for a small herd of their own as well as the government herd located in the general area); the school janitor; the postmaster; the manager of the local cooperative store; and the Eskimo pastor of the local church.

No outstanding arts and crafts are practiced at this village. Occasionally some ivory carving is done but the materials are not readily available although occasionally a mastodon tusk is extracted from the river banks. Total village income from this source for 1960 was estimated at $1995.00.

The total income from welfare, mostly aid to dependent children and old age assistance, amounted to $23,000. An additional $23,000 came from unearned sources, chiefly social security and unemployment insurance.

The combined total income from these sources amounted to $83,995.00, or an average of approximately $1714.00 per family per year.

There is one store, a village cooperative in the village. However, since most Noatak families average about three months in the Kotzebue Sound area, purchases are made at the Kotzebue stores. In addition to the items needed daily throughout their residence in the area they also purchase considerable supplies of flour, sugar, canned milk and other food items to take back to the village. Most of these items are slightly cheaper at Kotzebue.

SHISHMAREF

Shishmaref, an Eskimo village, is situated on a narrow sandy island just off the coast of Seward Peninsula, about 120 miles northwest of Nome. It is approximately 25 miles south of the Arctic Circle.

According to Shishmaref people, the original village site was inland on the banks of the Arctic River. They say there are mounds of whale bones there marking the site. The village has been located at or near its present site since before the arrival of Caucasians. The village faces the Chukchi Sea and immediately behind it is an eighteen-mile-wide lagoon or inlet into which flow two mainland rivers, the Arctic and the Serpentine.

The population of Shishmaref in 1957–58, was approximately 175. There is, however, considerable population movement back and forth between Shishmaref and Nome. Many families go to Nome for the summer only, primarily for wage employment with the mining company. An increasing number of families stay on in Nome permanently, although it is not unusual for some of them to stay a year or two and then move back to the village again. Fluctuation in available wage work probably accounts for most of the shifting. A few Shishmaref families—those who are exceptionally good ivory etchers or who have become professional artists—have moved as far away as Anchorage and Seattle.

Besides wage work, which amounted to $38,000 in 1958 according to Bureau of Indian Affairs estimates(13), cash income is derived from the sale of furs and hides, ivory carving, skin sewing and the sale of archeological artifacts. The net total from this source was estimated at $7,000, but this figure included the assessed valuation of new boats, sleds, parkas and mukluks made for family and local use.

Welfare assistance, such as aid to dependent children, old age assistance and general relief, totalled $20,000. An additional $7,000 came from unemployment insurance, social security and other unearned sources. On the basis of these figures the 1958 average income per family unit was approximately $2181.

At the time of the study there was one trading post in the village, owned and operated by the village. Significant food purchases were made in Nome during the summer and intermittently at Teller throughout the year.

At one time reindeer herds were locally owned and operated, serving not only as an important source of meat but also furnishing skins for clothing and sleeping bags. These herds no longer exist locally, but variable quantities of reindeer meat are shipped in from Teller. During the study year (1957) the total shipped in amounted to no more than 1000 pounds. According to the Bureau of Indian Affairs village report(13), the amount had increased to 5600 pounds during 1961.

SHUNGNAK

Shungnak, an Eskimo village, is located inland on the banks of the Kobuk River, about 150 miles due east of Kotzebue and approximately 25 miles north of the Arctic Circle. The area is forested predominantly with willow, alder, birch and spruce. Shungnak is a comparatively young village having been established about 1920. Most of the families now residing at Shungnak originally came from nearby Kobuk or from Ambler, two of the ancient seasonal campsites for these people. Because of blood relationships there is still considerable population movement among the three places.

A resume of the yearly hunting-fishing-trading cycle of aboriginal times as remembered by the village elders is given in the Appendix. Essentially the same seasonal food quest pattern is followed today except that the people are in residence at Shungnak village from September to the end of the school year in May. Consequently, hunters no longer roam over such large areas in search of caribou but confine most of their hunting and fishing to areas near the village. Many families still establish spring camps, usually on high ground near the village but very few go to Kotzebue for the summer. The few men that do go do so primarily to set up a jade shop where they make jewelry for the tourist trade. A few of the men also work in mines located near Shungnak. The women stay in the village or spend the summer at traditional campsites along the Kobuk River where they fish for salmon and dry it for winter use.

According to the 1959 Bureau of Indian Affairs economics report, approximately 58 percent of the estimated total cash income (about $35,700) for this village came from wage work.(13) This was mostly from summer work in the nearby mines. The only village residents receiving a year-round salary were the local postmaster, the cooperative store manager and the school janitor. A number of the young men belong to the National Guard for which they receive a nominal stipend.

Additional income—less than $1,000—came from the sale of jade, locally made jade jewelry, birch bark basketry and the sale of furs. Included in this total was the assessed valuation of new boats, sleds, snowshoes and fur clothing, most of which was made for local consumption only.

Just under $6,000 came from welfare sources, and an additional $10,000 from social security and unemployment insurance. On the basis of these figures the average cash income per family was estimated at $2014

SOUTHWESTERN ESKIMO

AKIAK

The Eskimo village of Akiak is located on the banks of the Kuskokwim River approximately 20 miles above Bethel, in a semi-forested (spruce, alder, birch) area bordering the foothills of the Alaska Range. At one time Akiak was a much more vigorous village than it is today. A Bureau of Indian Affairs hospital and the headquarters for a reindeer project were formerly located here, but these services were transferred to Bethel because of transportation difficulties (ocean going vessels can ascend the Kuskokwim only as far as Bethel).

Most of the homes in Akiak are of frame or log construction. A few are fairly large with several rooms, but most are small with one to two rooms and an attached shed. There are also several sod houses still in use.

There are two stores in Akiak, one a village cooperative, and the other owned by a local Eskimo family. However, there is much traffic by dog team and plane in winter and by boat and plane in summer between Akiak and the trading center of Bethel and most families do some purchasing while there.

In aboriginal times Akiak was a winter headquarters—the place where river, tundra and mountain Eskimo met to trade and for winter fishing. A description of the old seasonal migratory pattern of the mountain Eskimo as remembered by one of the elders of the village is given in the Appendix. Most of the descendents of these people now spend almost the entire year in the village environs. The men, and only occasionally entire family groups, make short hunting forays into the foothills. The only extensive trips made are by the men who regularly trap beaver.

During the summer, the able-bodied men now seek wage employment in nearby mines, at Bethel or wherever available, often leaving the family in the village.

Many of the descendents of the tundra people follow more closely the aboriginal living pattern. Many of these families, for example, still establish spring and fall camps out on the tundra. Persistent encouragement of continuous school attendance by the children has curtailed many of these activities, and each year fewer families go to the camps.

In 1959, the study year for this village, the Bureau of Indian Affairs estimated the total cash income from the sale of furs and hides at $5300 and from wages at about $34,832, or an average of approximately $1206 per family unit. Welfare assistance, totalling $15,650, increased this to $1712 per family.(13)

The manager of the village cooperative and the school janitor were the only residents receiving a yearly salary. Several individuals in the village had small local businesses from which they received a nominal recompense. These were the owners of a small retail store, a light plant, a tractor for logging and one family with mining interests.

NAPASKIAK

Napaskiak is a small tundra village—population 137—located on the banks of the Kuskokwim River near Bethel. Most of the houses are of log or frame construction, sometimes with only one room, but usually with two and occasionally three rooms. The larger dwellings are sometimes occupied by two related family groups. The majority of the village people are communicants of the Russian Orthodox Church; a few belong to the Moravian Church.

There is no store or postoffice in the village. Imported food and a limited number of other items are purchased at Oscarville directly across the river or at nearby Bethel. Most clothing items and equipment such as outboard motors are purchased from mail order houses. Mail is obtained directly from Bethel about 5 miles distant.

Salmon is the most important of the locally available foods and is included in the daily menu throughout the year. The fresh product is used in season, but for the greater part of the year dried fish are used. Other foods listed in the food quest sequence are used for limited times and in limited amounts seasonally. Many of these seasonal foods are not used to the extent they were formerly; this is illustrated by the fact that during 1958, the year food records were collected at the village, only three family groups went to spring camp. The usual diet of the villagers at this time consisted of dried salmon or fresh whitefish, bread or hotcakes, coffee or tea. The typical diet of those at spring camp included fresh wildfowl, fresh fish, bird eggs, bread or hot cakes, coffee or tea, edible greens and such berries as remained on bushes throughout winter.

Cash income at Napaskiak as in all Eskimo and Indian villages, is extremely variable from year to year. The Bureau of Indian Affairs estimate(13) of cash income from the sale of furs, mostly mink, in 1958 was $10,000, and that from wages, chiefly summer employment, $10,500, for an average of approximately $630 per family. Welfare assistance, which totalled $29,945, raised this average to approximately $1565 per family.

KASIGLUK

Kasigluk, a tundra village in Southwest Alaska, is located about thirty miles northwest of Bethel on the Willidulli Slough near the Johnson River. This village is of recent origin, most of the residents having come from the nearby tundra village of Nunachuk. In 1957–58 the total population was about 140.

The entire area around Kasigluk is characterized by lakes, ponds, sloughs, rivers, and spaghnum bogs which makes it a good winter fishing area. Able and energetic families can obtain sufficient fresh whitefish and blackfish which, along with their dried salmon stores, furnish the bulk of the nutrients in their winter diet. Salmon is not available in the immediate area, but in May or early June, just after the ice goes out of the rivers, most of the families go to traditional fish camp sites near Bethel where they stay until late summer or early fall. Only a few families remain at the village during the summer. They depend on whatever whitefish they can obtain from the surrounding sloughs and lakes.

Fuel shortage is a constant problem at Kasigluk. The supply near the village has long since been exhausted. The men and older boys must go almost daily to the Johnson River, several miles from the village for meager supplies of river driftwood, or they gather willow wherever they can find it on the tundra. In Kasigluk it is not unusual even in winter, for fires to be limited to the cooking period only. A few families with young able-bodied men who work for wages during the summer, may use limited amounts of fuel oil. Seal oil, available only by purchase from coastal Eskimos, is never used for this purpose.

There is no trading post at Kasigluk. All store purchases are made at either the nearby village of Nunapitchuk or at Bethel. Most dry goods and other items are obtained from mail order houses.

Cash income varies widely from family to family and within the family from year to year. In recent years a few men have succeeded in obtaining summer employment, mostly in the Bethel area or at the canneries. There is a National Guard contingent at Kasigluk and this contributes materially to the village income. Trapping for mink and muskrat is limited in the area and is an important source of income to only a few families. Little attention is given to arts and crafts because of the unavailability of suitable materials. Welfare payments, including Bureau of Indian Affairs general welfare, aid to dependent children, and old age assistance, are a major source of village income. No total income figures are available for this village, but they would be approximately the same as those for Napaskiak. These villages have similar local resources except that income from mink and muskrat is considerably greater at Napaskiak. Wage earning opportunities are also similar.

HOOPER BAY

Hooper Bay is located on the Bering Sea Coast about halfway between the mouths of the Yukon and Kuskokwim Rivers. It is one of the larger Eskimo villages with a population of 460(14).

The village is built on a series of three hillocks formed by a combination of sand, old vegetation and the refuse from past dwellings. The immediate surrounding terrain, extending many miles inland, is a low-lying area interlaced with tidal sloughs and rivers and dotted with lakes, ponds, bogs, and swamps.

This whole coastal delta area is sometimes flooded by incoming tides. Petroff(15) describes the severe storms of this area as follows: "long continued and heavy gales from the south raise the water on Norton Sound at least 10 feet above ordinary tidemark—while whole villages with much loss of life, have been destroyed in the past by these storms, those occurring in spring and early summer are responsible for depositing the huge supplies of driftwood on shore, which until recent times was the only fuel and building material available."

Some years, however, the storms carry the driftwood well past the village causing real hardship for the people, for today, as in the past, driftwood is still the major source of their fuel supply. Occasionally the high water makes a virtual island of the village.

Nelson(16) describes the weather along this portion of the Bering Sea as "the most disagreeable in the world." The winters are long and severe and while the snow fall is not excessive, the winds cause it to drift heavily. Getting around the village at such times is difficult.

Sudden changes in the weather off the coast during the sealing season are always of grave concern to the villagers until all seal hunters have been accounted for. Hooper Bay has many stories of men lost because of the drifting of the ice pack during these storms. It is probably because of these hazardous conditions that the young men at Hooper Bay do not begin seal hunting until they are 18 or 19 years old. In Shishmaref and some of the other more northern coastal villages they may accompany their elders as early as 12 to 14 years of age.

Hooper Bay as described by Brandt(17) is located "in the center of a vast waterfowl breeding ground—in one of the largest deltoid regions of the world". In the flats adjacent to the village and on the upland areas beyond—20 to 100 feet higher—are the breeding grounds of ducks, geese, loons, cranes, swans, ptarmigan, curlews and a host of smaller birds. In addition, in later winter and early spring (April and May), hordes of transient birds fly to the north over the area, returning in late summer and early fall on their southbound trip.

Many of these birds, especially ducks, geese and ptarmigan combined may have equalled fish and seal as important items in the food economy of these people. Fur animals are relatively scarce in the area and are limited chiefly to a few mink, muskrat and seal. Waterfowl were and still are a major source of protein in the diets; in former times the skins were regularly used to make winter parkas.

In the early years most families moved from campsite to campsite, usually four or five times a year, in order to secure sufficient family food resources. In spite of the frequent moves they experienced occasional periods of starvation which are recalled by some of the people living today. One informant mentioned such an occasion in her youth, and told how the people who ate from a stranded whale became ill and died. In recent years several men also became ill and two died from eating meat from a stranded whale. The cause of death was found to be botulism, type E(18)(19). Food shortages are most likely to occur during late winter and early spring.

The majority of the present day inhabitants of the village remain in residence the year 'round. The hunters make relatively short trips, usually of a few days duration, but occasionally lasting as long as two weeks or more, out into the neighboring tundra areas. Formerly, many of these people lived together the greater part of the year in much smaller groups of 3 or 4 related families at more scattered locations. When Nelson visited this area in the 1870's he reported finding many such small settlements(16). At appropriate seasons it was customary for related family groups to establish fishing, hunting and berry camps sometimes at considerable distances from the village, returning to the village for ceremonials and other group activities such as wildfowl round-ups.

There are now very few families who still follow the old camping sequence. The most important camping period now is in the fall for berries and even then it may be for a period of a few days only, with a maximum of two weeks.

For the majority of the able-bodied men of Hooper Bay, the opportunity for wage earning is limited to summer work at the Bristol Bay canneries. Some years, the spring storms previously described prevent the men from leaving the villages in time for the start of the canning activities. In 1958, the dietary study year, the weather was favorable, and those who did obtain work earned take-home pay in amounts from $200 to $700 dollars for the season.

Total income from wages in the village this same year was estimated by the Bureau of Indian Affairs to be $28,000.(13) Included in this was $13,000 for local school employees. The remaining $15,000 included payments to the local representatives of the Alaska Department of Health and Welfare Sanitation Aide Program; the manager of the local cooperative store, a village owned business; the earnings of the owners of two local retail stores;

boat rentals and wages for lightering the annual supplies, as well as the cannery work already mentioned.

The sale of mink and muskrat skins is a moderate and variable source of income for some of the village men. The Bureau of Indian Affairs estimate of income from this source for 1958 was $2,000 and for 1960, $2,800. Welfare assistance was also a significant source of village monies, amounting to $27,000 in 1958, a year when a significant number of individuals were hospitalized for tuberculosis. This figure was reduced to $11,000 by 1960(13). The average yearly family income from all sources in 1958 was $948.

NEWTOK

Newtok is a small village in southwestern Alaska located on the tundra mainland in the vicinity of Hazen Bay near Nelson Island. The present village site was established in the early 1950's on a former seasonal campsite. The site was chosen because mink and muskrat trapping and black and needlefish fishing were known to be fairly good in the general area; and the location was considered far enough inland to afford protection from destructive coastal storms and yet not too far from the traditional coastal sealing and fishing grounds.

Most of the inhabitants came from the old village of Keyaluvik which was nearer the coast and to the source of fish, seal and wildfowl. The old area, however, was occasionally devastated by floods with considerable loss of life and property.

Petroff(15) describes the Bering Sea Coastline thusly: "The ordinary tides are small and give a rise and fall of only about 2 to 3 feet, but the winds from either north or south produce a striking variation. A long continued and heavy gale from the south raises the water of Norton Sound at least ten feet above ordinary tidemark and overflows large stretches of the coast. Some of the heaviest of these gales occur during winter—and whole villages have been destroyed along with many of the inhabitants." This was the situation at Keyaluvik and the major reason for moving the village farther inland.

In 1958–59, transportation in and out of Newtok was mostly by small boat from late spring after the ice moved out of the sloughs and bay until it began to form again in the fall. In winter dog teams were used. There was no regular plane or mail service nor were radio facilities available. Since then these services have been established and a new school built.

In 1958–59 most Newtok families lived in sod igloos, all of them quite small because of the sparsity of locally available building and heating materials. Driftwood, found near the channel that flows between Baird Inlet and Etolin Straits, was the major source of building material and fuel. Trees in the general area were limited to a few scraggly willow patches. Transporting the drift logs to the village is both exceedingly difficult and time consuming, for they have to be dragged by boat through winding sloughs that rise and fall with the tides.

Sod igloos were used only from about mid-October, when the fall wind storms begin, until April. For the remainder of the year most families lived in tents, either at their sealing and fish camps on the shores of Hazen Bay or at the village site.

The advantage of sod igloos is that they can be kept warm and snug during cold freezing weather with a minimum of fuel. Their main disadvantage is that since they are dug several inches into the tundra, they are exceedingly damp the rest of the year. The ground on which Newtok is built is especially wet and boggy. Walking about the village was very difficult and one was forever retrieving ones' boots from the waterlogged spaghnum.

Since 1958, because of the increased number of men obtaining summer cannery work, more and more families are having building materials shipped in for building frame houses with floors raised well above the tundra level. These dwellings require considerable more fuel than do the sod structures but they are relatively free of drip and dampness during the non-freezing portion of the year.

In April almost the entire village goes to the sealing camp at Nlulugak, six miles from Tununak on Nelson Island. Here they do their spring sealing and later, herring and flounder fishing. Many families stay on at this camp until late summer.

There are three stores in the village, one a native cooperative and two owned and operated by local families. In 1958–59 they all had similar yearly inventories totalling about $2500 each. A considerable proportion of both summer and winter purchases are still made at Tununak on Nelson Island as in the past.

Cash income is chiefly from the sale of muskrat, mink and seal skins; from locally owned retail businesses (2 in number), summer wage work (mostly in canneries) and from National Guard salaries. Revenue from the sale of grass basketry and ivory carving provides a minor contribution. The Bureau of Indian Affairs(13) estimated total income from all these sources for 1959 at $18,673, or an average of approximately $889 per family unit. Welfare assistance mostly to families with tuberculosis or other health problems increased this to approximately $1294 per family.

CHAPTER III

ADEQUACY OF THE DIET AND NUTRIENT SOURCE

CALORIES

The caloric requirement for all Eskimos and Indians reported in this study was estimated to be the same as that for other United States residents of similar age and sex(4). However, the requirement may be significantly greater for the majority of these people for they live where arctic weather conditions prevail the greater part of the year.

Caloric intake data by age and sex are presented in Table 1. At no age level is the mean daily caloric intake equal to that recommended by the National Research Council and the percentage of caloric intakes deficient by these standards is high at all age levels.

One of the most striking features of the Alaskan Indian and Eskimo diet is the extreme range in the individual's mean daily nutrient intake. This might be expected in an economy essentially dependent on hunting and fishing, for in spite of efforts to plan ahead, adverse weather, lack of game and other factors often upset the best laid plans. (Table 1)

Since the preschool years constitute an especially critical growth period more detailed information was sought concerning dietary patterns in this age group, particularly with reference to geographical differences in the nutrient adequacy of the diet. The lowest mean caloric intakes at the 2–5 year age level were found among southwestern Eskimo children. About two-thirds of their dietary records showed intakes less than the NRC recommended levels. The highest mean caloric intakes at these same age levels were found among Athapascan Indian children; however, even in this group only slightly more than half of their diets were adequate according to NRC standards. At six years of age the mean caloric intake was comparable for all geographic areas with a high percent showing caloric deficiency (Table 2).

SOURCE OF CALORIES IN THE DIET:

Per capita calorie source by village is presented in Tables 3 and 4. Over one-third of the mean per capita caloric intake in all villages came from cereal and bread products, with approximately another third provided by meat and fish combined.

Meat was a greater source of calories in northern diets and fish in those from the southwest, except at the village of Akiak. This village is located in a forested area where moose, ground squirrel and beaver are available. At the other southwest villages meat sources were rather meager, consisting primarily of limited seasonal supplies of mink, wildfowl, rabbit and muskrat. Seal was available at Hooper Bay and Newtok, but their yearly take of this animal is considerably less than at the northern coastal villages.

Calories from the fats 'as such' category include only those obtained from fats served as a spread for bread, crackers and hotcakes, and oil used as a dip for dried or frozen meat or fish. Newtok had the highest number of calories per capita from this food group, Kasigluk the lowest. Both are southwest tundra villages, but Newtok is located near the coast and the people spend part of the year at coastal camps hunting seal. Consequently they have excellent supplies of seal oil, much of which is used as a dip for dried fish, the most important food in their winter dietary.

TABLE 1.—CALORIC INTAKES OF ALASKAN ESKIMO AND INDIAN DIETS: ALL AREAS AND VILLAGES, ALL SEASONS, BY AGE AND SEX

Age Sex Category	Number of Records	Caloric Intakes		
		Mean Daily Intake	Intake Range	Percent Under N.R.C.(4)
Adult male 20–60 yrs.	746	2649	1006–5740	73.2
Adult male 60 + yrs.	112	2258	893–3820	71.4
Adult female 20–60 yrs.	633	2185	930–4503	60.4
Adult female 60 + yrs.	120	1681	739–3381	65.3
Adult female Pregnant	121	2196	1093–4300	73.6
Adult female Lactating	193	2443	1197–5263	83.8
Male 13–19 yrs.	303	2386	1174–4161	87.0
Female 13–19 yrs.	298	1992	893–3820	81.1
School child 7–12 yrs.	916	1966	737–4174	72.7
Preschool 2–6 yrs.	843	1543	529–3262	53.0

TABLE 2.—CALORIC INTAKES OF ESKIMO AND INDIAN CHILDREN 2 TO 6 YEARS OF AGE(4)
By Area, By Age Level

Area	2 to 3 Years			4 To 5 Years			6 Years		
	No. Records	Mean Daily Intake	Percent Under NRC	No. Records	Mean Daily Intake	Percent Under NRC	No. Records	Mean Daily Intake	Percent Under NRC
Northcentral Athapascan	41	1519	32	61	1720	46	31	1772	45
Northern Eskimo	86	1393	42	111	1641	63	48	1742	52
Southwestern Eskimo	187	1261	61	160	1560	67	118	1747	51

TABLE 3.—PROPORTION OF CALORIES FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy	155	203	196	187	183	104	174	93	110	121	97
Egg	12	16	7	19	26	7	9	5		16	15
Meat	301	427	444	507	442	536	435	43	32	143	78
Fish	198	109	303	53	113	271	506	599	778	532	585
Fats as such	110	121	230	195	270	195	131	135	32	96	348
Fruits	147	70	98	32	157	57	97	86	80	86	15
Vegetables	39	97	22	36	63	45	54	13	11	25	17
Breads & Cereals	764	709	721	929	407	528	692	715	767	841	597
Sugar Products	210	238	194	153	161	144	156	135	88	92	140
Miscellaneous	27	23	16	11	26	7	7	5	5	4	
Mean Per Capita Intake	1963	2013	2231	2122	1848	1894	2261	1829	1903	1956	1892
Percent Under NRC (4)	77	67	57	64	70	79	59	82	71	69	80
Number of Records	257	369	462	362	372	285	228	422	351	1212	247

TABLE 4.—PROPORTION OF CALORIES FROM LOCAL AND IMPORTED FOODS

By Village

Village	No. Records	Per Capita Intake	Calorie Source			
			Local	Imported	School	Mixed Food Preparations
N. Central Athapascan						
Allakaket	257	1963	491	1375	22	75
Huslia	369	2013	408	1530	....	75
Northern Eskimo						
Point Hope	362	2122	641	1349	81	51
Noatak	462	2231	848	1212	66	105
Shishmaref	372	1848	759	899	132	58
Shungnak	285	1894	873	849	92	80
Southwestern Eskimo						
Akiak	228	2261	841	1148	82	190
Napaskiak	422	1829	653	1021	66	89
Kasigluk	351	1903	782	949	68	104
Hooper Bay	1212	1956	717	1100	58	81
Newtok	247	1892	855	972	57	8

Kasigluk is located far inland and their seal oil supplies, obtained by cash purchases, are quite limited. Their preferred use of this product is in the preparation of various agutuk or dessert mixtures.

Calorie sources in adult male and female diets were quite similar on the whole. Females obtained slightly more calories from dairy products, fruits and vegetables, and the males slightly more from other food categories (Tables 3 and 4).

Calorie sources in the young person's diet varied from adult sources in several significant respects. Milk, for example, supplied less than 3 percent of the total calories in adult diets, but furnished 14 percent in the diet of children 2 to 6 years of age. The schoolchild's diet contained fewer milk calories than did that of the preschool child, in spite of the fact that most of them received milk at the school lunch. However, a significant number of young preschool children continued to be bottle-fed well beyond two years of age.

Calories from meat and fish were highest in adult diets. These foods were much less important as a calorie source in the adolescent child's diet and even less so in the 2 to 6 year-old's diet.

The same pattern holds true for calories from fats 'as such', and from sugar products. On the other hand, the diet of the adolescent and school child contained more calories from fruits, vegetables and bread and cereal products, generally through the school lunch which is served in the Eskimo villages only.

Imported foods provided more calories than local foods in all the study villages. Their use was somewhat higher in the Athapascan Indian villages, probably because these villages are located in good mining and trapping areas where the people have had closer and more continuous daily association with Caucasians over a longer period of time than have most Eskimos. Their diets were similar to those of the average American family except that moose and beaver were their primary meat sources, and their use of fruits and vegetables was more limited, primarily because of cost. The two Indian villages had fewer total calories from local food sources and more sugar calories per capita.

In general, approximately equal amounts of calories came from local and imported foods on adult diets, while on the adolescent and preschool child's diet local foods provided about one-third of the calories and slightly less than one-third on the school child's diet (Tables A–1 through A–3, Appendix).

PROTEIN

Mean daily protein intakes were high at all age and sex levels and the percents with a deficiency in this nutrient were quite low (Table 5). Slightly less than one-third of the total calories in the overall adult diet came from protein. There was very little difference due to sex, except that from 17 to 19 years of age, females obtained fewer protein calories than did the males (Table A–1 Appendix).

Adult males under 60 years of age in the northern village of Shungnak had the highest percentage of calories from protein. This village is admirably situated for the hunting of caribou as well as for obtaining good supplies of fish.

In the southwest, the interior tundra village of Kasigluk had a consistently higher percentage of calories from protein than did the other area study villages with one exception: the 17 to 19 year old males obtained less than one-fifth of their total calories from protein. Food intakes at this age level were very erratic in all the villages, especially during those periods when they were not actively engaged in hunting, fishing and hauling wood.

TABLE 5.—PROTEIN INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS
All Areas and Villages
All Seasons, By Age and Sex

Age and Sex Category	Number of Records	Protein Intakes: Mean Daily Intake (gm)	Intake Range (gm)	Percent Under NRC(4)
Male 20-60	746	202.6	28.2–759.3	2.9
Male 60 +	112	179.9	46.9–438.0	4.2
Male 13–19	303	161.9	23.7–482.7	15.6
Female 20–60	633	171.9	27.5–618.3	2.6
Female 60 +	120	133.8	36.0–365.4	3.2
Female Pregnant	121	172.1	39.4–454.1	8.0
Female Lactating	193	182.8	29.8–495.5	14.7
Female 13–19	298	136.0	46.9–438.0	14.0
Child 7–12	916	120.2	13.2–361.3	10.2
Child 2–6	843	94.5	20.2–324.8	7.5

The per capita intake of protein by village was high; most of it was of local origin, primarily meat and fish. Meat was a more important source in the northern areas and fish in the southwest.

The only other significant sources of protein in these diets were milk, bread and cereal products. Together they provided from as little as 8 percent of the total protein in Shungnak diets to about 28 percent at Point Hope (Tables 6 and 7).

The school child's diet contained about twice as much milk protein as the adult diet. Most of it was from milk served at school. But even in the children's diets, meat and fish were the major sources of this nutrient (Tables B–2 through B–4 Appendix).

FAT

Approximately one-third of the total calories in adult diets came from fat. The proportion was slightly less for adolescent males than for females (Table C–1, Appendix). A comparison of per capita fat intakes in Eskimo and Indian diets shows that, in

TABLE 6.—PROPORTION OF PROTEIN FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village
In Grams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allaka-ket	Huslia	Noatak	Point Hope	Shish-maref	Shung-nak	Akiak	Napask iak	Kasig-luk	Hooper Bay	Newtok
Dairy	8.9	9.4	10.2	10.0	9.9	5.0	8.2	4.6	7.0	6.2	4.9
Eggs	0.6	0.9	0.3	1.4	1.4	0.3	0.4	0.3	....	1.1	1.2
Meat	58.7	60.7	79.2	77.4	95.3	90.2	53.0	7.9	6.3	27.0	16.1
Fish	40.4	18.0	61.5	10.3	19.8	52.3	66.6	102.4	153.4	84.1	97.1
Fats	0.3	0.8	1.0	0.7	0.7	0.2	0.5	0.1	....	0.1	0.1
Fruits	0.9	0.4	0.9	0.2	1.1	0.5	0.4	0.4	1.7	0.7	0.1
Vegetables	1.3	3.1	1.2	1.7	2.7	1.9	2.5	0.6	0.7	1.3	1.0
Breads et al	15.1	15.1	15.4	18.3	9.3	9.0	13.9	12.7	15.5	14.1	9.2
Sugar et al	0.1	0.2	0.3	0.1	0.1	0.2	0.1	....	....	....	....
Miscellaneous	1.3	0.9	0.7	0.5	1.1	0.3	0.6	0.3	0.2	0.1	....
Per Capita Intake	127.6	109.5	170.7	120.6	141.4	159.9	146.2	129.3	184.8	134.7	129.7
Number of Records	257	369	462	362	372	285	228	422	351	1212	247
Percent under NRC(4)	12.3	6.7	4.2	14.5	6.8	4.3	3.5	9.2	2.1	13.6	8.6

TABLE 7.—PROPORTION OF PROTEIN FROM LOCAL AND IMPORTED FOODS

By Village

In Grams

Village	No. Records	Total Per Capita Intake	Protein Source			
			Local	Import	School	Mixed
N. Central Athapascan						
Allakaket	257	127.6	70.2	48.5	2.2	6.7
Huslia	369	109.5	66.8	34.9	....	7.8
Northern Eskimo						
Noatak	462	170.7	127.5	27.7	2.0	13.5
Point Hope	362	120.6	81.4	29.8	3.6	5.8
Shishmaref	372	141.4	109.8	20.9	5.5	5.2
Shungnak	285	159.9	129.6	15.4	4.1	10.8
Southwestern Eskimo						
Akiak	228	146.2	110.8	25.3	3.2	6.9
Hooper Bay	1212	134.7	109.6	20.4	2.3	2.4
Napaskiak	122	129.3	107.9	16.4	2.3	2.7
Newtok	247	129.7	113.7	13.6	2.4	....
Kasigluk	351	184.8	152.9	21.1	2.3	8.5

general, fat intakes are higher among the Eskimos. Imported fats appear to be equally important for both racial groups; however, Eskimos obtain and use larger amounts of local varieties of fat (Tables 8 and 9).

The kinds and amounts of local fats used are determined by a number of factors, chiefly: village location, season, village population in relation to total local supplies, sex, and acculturation experiences. Napaskiak and Newtok, for example, are both located in southwest Alaska and they are of comparable size. Napaskiak is located on the banks of the Kuskokwim River approximately 40 miles from the coast, while Newtok is located on the banks of a tidal slough near Hazen Bay. The people at the latter village spend about five and one-half months out of every year at various coastal hunting and fishing sites where they obtain, successively, seal, herring, wildfowl and their eggs, and flounder. Although the sealing season is relatively short—about 4 to 6 weeks—the seal oil supplies obtained are usually sufficient to meet their yearly needs. It is used almost daily in their diets.

By comparison, in Napaskiak the seal oil supply is quite limited since most of it is purchased from coastal Eskimos. According to village informants, only a few Napaskiak families now

TABLE 8.—PROPORTION OF FAT FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy	7.0	10.2	10.7	10.9	11.1	5.8	9.8	5.4	5.5	7.0	5.6
Egg	....	1.2	....	1.6	2.4	....	....	....	....	1.3	1.1
Meat	12.9	19.4	13.3	20.5	7.8	15.4	30.8	2.0	1.0	3.0	2.0
Fish	2.9	2.8	6.2	1.1	4.9	4.2	20.9	17.9	24.9	18.8	19.8
Fats*	12.1	12.3	24.8	21.9	35.1	22.0	13.7	15.3	3.6	10.9	39.2
Fruits	....	....	2.2	....	3.6	....	6.5	6.7	5.6	6.3	....
Vegetables	1.5	....	....	....	1.9	....	....	....	....	....	....
Bread and cereal	31.2	31.0	29.6	37.8	19.6	25.4	25.6	31.4	34.2	38.5	35.6
Sugar	....	....	....	....	....	....	....	....	....	....	....
Miscellaneous	....	....	....	....	....	....	....	....	....	....	....
Per Capita Intake	67.6	76.9	86.8	93.8	86.4	72.8	107.3	78.7	74.8	85.8	103.3
Number of Records	257	369	462	362	372	285	228	422	351	1212	247

* Served as a separate food item.

TABLE 9.—PROPORTION OF FAT FROM LOCAL AND IMPORTED FOODS
By Village
In Grams

Village	Number of Records	Fat Source			
		All Food Sources	Local Foods	Import Foods	Mixed Foods
N. Central Athapascan					
Allakaket	257	67.6	15.1	50.4	2.1
Huslia	369	76.9	16.6	57.1	3.2
Northern Eskimo					
Point Hope	362	93.8	34.0	57.7	2.1
Noatak	462	86.8	34.6	50.7	1.5
Shungnak	285	72.8	32.3	39.2	1.3
Shishmaref	372	86.4	40.2	42.6	3.6
Southwestern Eskimo					
Akiak	228	107.3	43.7	49.8	13.8
Napaskiak	422	78.7	21.6	50.2	6.9
Kasigluk	351	74.8	25.9	42.6	6.3
Hooper Bay	1212	85.8	26.2	53.1	6.5
Newtok	247	103.3	42.1	60.4	0.8

migrate to the coast to do their own sealing as in former years. Much of their seal oil supply is used preferentially in the preparation of agutuk (dessert) mixtures which are not daily food items but are served as occasional treats throughout the year.

At one time salmon oil was an important item in the Napaskiak diet, but the extraction of oil from salmon is another of the old-time customs that is rapidly disappearing.

As a result of differences in location, the per capita intake of fat from local foods at Newtok is about twice that at Napaskiak. Furthermore, almost 40 percent of the fat in Newtok diets is served as a separate food item while at Napaskiak less than one-fifth of the total is used in this way (Tables 8 and 9).

Hooper Bay is perhaps the best example of a village that has reached a size which puts a strain on local food supply. It is a coastal village located on Norton Sound about halfway between the Yukon and Kuskokwim river deltas. The locally available foods are similar to those of Newtok to the south. The most important food resources common to these two villages are seal, wildfowl, needlefish, blackfish, herring, tom cods and muskrats. The villages differ in that Newtok people also obtain flounder and a larger number of muskrat and mink per capita, while at Hooper

Bay there is a limited salmon run most years, and clams, whitefish, wild berries and greens are available. Both villages were probably using their local food resources to the maximum at the time food records were collected (1957–58). However, Newtok was the smallest of all the study villages (population 117) and Hooper Bay the largest (population 431). The per capita fat intake at Hooper Bay was not only less than that at Newtok but Newtok diets contained almost half again as much fat from local sources.

The high percentage of fat from local sources at Akiak may be somewhat misleading as the records for this village were representative of two seasons only—fall and winter. A data collection trip was made at the time when beaver, a very fat animal, was a prominent food in their diets. This food is only available for about a month to six weeks.

Akiak is located about 30 miles upriver from Napaskiak in a wooded area with easy access to both the foothills of the Alaska Range and tundra areas. Moose and beaver were important animal foods and occasionally bear and caribou meat and fat appeared on the village dietary. Also, several families still seriously hunt ground squirrels, rabbits and other small rodents.

In general, the intake of fat from local sources was higher in the northern Eskimo villages all of which have access to good local supplies. In three of these villages—Point Hope, Noatak, and Shishmaref—the people hunt sea mammals (bowhead whale, ugruk and seal at Point Hope; beluga whale and ugruk at Noatak *; and seal and ugruk at Shishmaref). In addition at Point Hope, Noatak and Shungnak they hunt caribou. All of these animals are good sources of fat.

Shungnak people no longer journey to the coast (Kotzebue Sound) to hunt ugruk and obtain additional supplies of oil by barter as in the past; instead, seal oil supplies are now shipped in. Porcupine, marmot and bear were once important seasonal sources of fat in the diet of these people, but both the hunting area and activities have been greatly restricted, and are now confined for the most part to a limited area near the village. Consequently, these animals now serve only as a very occasional fat source.

The two Athapascan Indian villages—Huslia and Allakaket—are both located on the banks of the Koyukuk River in north-central Alaska in a predominantly spruce-birch forest area. Moose and beaver are their primary local sources of fat, although caribou

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* Noatak village is about 40 miles inland on the banks of the Noatak River but the people still migrate to the coast in late May and remain there throughout the summer.

are available at Allakaket about once every three years. They were not available the year diet records were collected.

Because of current hunting and trapping regulations, moose and beaver fat are probably included in the Indian diet less often than in the past. The use of other animals such as bear, porcupine and rabbits has also been curtailed, primarily because most of the families stay in the village the year round and the supply in the village environs is dwindling. Muskrats which are available near the village, are still a prominent food in the late winter or early spring diets. They are hunted by men, women, and children, in fact, by anyone who can handle a .22 rifle. The total amount of fat from all local sources in the present day Indian diet is considerably less than in the Eskimo diet. Like the Kuskokwim Eskimo, interior Indians used to extract salmon fat from fish heads but this is no longer a common practice.

A comparison of mean daily fat intakes in the diets of adult males, adult females and school children reveals that males have somewhat higher fat intakes, including more from both local and imported sources. The child from 7–12 years of age obtains only about one-fourth of his total fat intake from local sources (Tables C–2 through C–4, Appendix).

Another very important change that has taken place in the diets of these people, especially that of the majority of the Eskimos, is the increase in the use of the more saturated varieties of fats. These are primarily imported butter, margarine, hydrogenated fat and edible beef tallow.

CARBOHYDRATE

Another of the major changes in the Indian and Eskimo diet brought about by closer association with Caucasians is the increased content of carbohydrate. Carbohydrate sources were negligible in aboriginal times and consisted primarily of that obtainable from such meat and fish products as the livers, fish roe, whale muktuk, the stomach contents of moose and caribou and limited supplies of plant products such as wild edible greens, roots and berries. At best these were meagre sources of this nutrient in the overall dietary.

CALORIES FROM CARBOHYDRATE

Carbohydrate supplied approximately one-third of the calories in adult diets and slightly more in the adolescent diet. In the overall dietary of all areas and villages combined, there was very

TABLE 10.—PROPORTION OF CARBOHYDRATE FROM LOCAL AND IMPORTED FOODS

By Village
In Grams

Village	Number of Records	Carbohydrate Source				
		Mean Per Capita Intake	Local	Import	School	Mixed
N. Central Athapascan						
Allakaket	257	217.0	4.8	202.5	3.2	6.5
Huslia	369	224.6	6.1	217.0	....	1.5
Northern Eskimo						
Point Hope	362	212.7	1.1	200.7	8.9	2.0
Noatak	462	182.8	6.2	161.7	9.7	5.2
Shishmaref	372	182.1	2.1	153.7	22.7	3.6
Shungnak	285	141.5	3.2	121.9	11.5	4.9
Southwestern Eskimo						
Akiak	228	176.0	3.2	156.2	9.1	7.5
Hooper Bay	1212	157.5	2.4	144.4	7.0	3.8
Napaskiak	422	143.8	0.6	130.5	8.5	4.2
Newtok	247	111.7	1.4	102.8	7.1	0.4
Kasigluk	351	151.0	0.4	135.9	9.2	5.5

little variation in percentage of calories obtained from carbohydrate by males and females at different ages (Table D–1, Appendix).

There were, however, significant variations among the villages in per capita carbohydrate intake, with the Athapascan Indians having the highest intake. In general, the northern Eskimo had a higher intake than those living in the southwest (Tables 10 and 11).

SOURCE OF CARBOHYDRATE

Breads and cereals were the primary source of carbohydrate in the diets studied, accounting for one-half or more of the total per capita intake in all villages except Shishmaref where they furnished only one-third. Sugar products—refined sugar, candy, syrup and soft drinks—were a significant but variable source of carbohydrate in all villages. They provided a somewhat higher percentage in the northern study villages, especially in the Indian villages. The percentage of carbohydrate provided by milk and fruit products was also higher in the north.

TABLE 11.—PROPORTION OF CARBOHYDRATE FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village
In Grams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allaka-ket	Huslia	Noatak	Point Hope	Shish-maref	Shung-nak	Akiak	Napask-iak	Kasig-luk	Hooper Bay	Newtok
Dairy	13.5	15.9	13.7	13.4	16.4	7.9	11.4	6.3	9.1	8.3	6.9
Egg	......	......	......	......	0.2	......	......	......	......	......	0.1
Meat	2.0	2.2	4.4	4.9	1.7	4.2	4.8	0.9	0.8	1.0	......
Fish	0.4	0.4	0.2	......	0.7	0.4	0.9	0.3	1.9	0.8	1.2
Fats as such	0.2	0.2	0.2	0.2	0.2	0.1	0.4	0.1	......	......	0.2
Fruits	35.8	18.6	19.6	8.5	38.9	14.4	9.9	6.8	6.9	8.0	2.0
Vegetables	5.2	15.7	3.9	6.4	9.3	7.4	8.1	2.0	1.9	3.5	2.9
Grain Products	103.5	106.5	94.3	137.6	64.3	69.3	101.4	93.2	105.9	111.0	62.6
Sugar Products*	52.1	60.6	43.9	40.0	45.7	36.5	38.4	33.2	23.4	23.9	35.7
Miscellaneous	4.3	4.5	2.6	1.7	4.7	1.3	0.7	1.0	1.1	1.0	0.1
Per Capita Intake	217.0	224.6	182.8	212.7	182.1	141.5	176.0	143.8	151.0	157.5	111.7
Number of Records	257	369	462	362	372	285	228	422	351	1212	247

* Candy, soft drinks.

These four major food groups accounted for 90 percent or more of the carbohydrate in all villages, most of it from imported food products. Local berries were used when available in all villages except the most northerly village, Point Hope. The few Point Hope families who still make summer and fall camps along the Kukpuk and other mainland rivers, may collect limited quantities.

The use of canned and dried fruits was limited by cost. They appeared more frequently in northern diets than in those from the southwestern area where the per capita monetary income is considerably lower. According to the 1960 census report, the average yearly family income in the Wade Hampton election district in which Hooper Bay is located was approximately $900, while in the northern district it was estimated to be about $2,400(13).

A comparison of the per capita carbohydrate intakes from fruit by age categories showed that the school and teen-age child's intake was highest, with about one-third of the intake provided by the school lunch. However, this applied only to the diets of children from the Eskimo villages who participated in a school lunch program. Canned and stewed dried fruit were quite frequently served at school.

The percentage of carbohydrate provided by the various food sources at different age levels and by sex is presented in Tables D–2 through D–4, Appendix.

CALCIUM

Mean daily calcium intake levels among Alaskan Eskimos and Indians were considerably below those recommended by the National Research Council for all age, sex, and metabolic status groups. Three-fourths or more of the diets for each of the above categories were deficient by these standards. The ranges in mean intake level of this nutrient were extremely wide.

Adult males and females over 60 years of age had lower mean daily intake levels than did younger adults. This may have been due either to a smaller intake of food or to stricter adherence to old and well established dietary patterns in which milk was lacking. The addition of evaporated milk to coffee is now a fairly common practice especially for younger adults (Table 12).

TABLE 12.—CALCIUM INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS

All Areas and Villages, All Seasons, By Age and Sex

Age-Sex Category	Number of Records	Calcium Intakes		
		Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC(a)
Adult male 20-60 yrs	746	576	399-3813	75
Adult male 60 + yrs	112	461	381-2010	87
Adult female 20-60 yrs	633	481	254-2197	87
Adult female 60 + yrs	120	322	87-886	95
Adult female Pregnant	121	561	279-3115	97
Adult female Lactating	193	531	197-2027	99
Male 13-19 yrs	303	660	372-1880	96
Female 13-19 yrs	298	580	381-2010	97
School Child 7-12 yrs	916	684	250-1936	80
Preschool Child 2-6 yrs	843	641	33-2319	85

There appeared to be only a moderate increase in mean daily calcium intake during pregnancy and lactation. About 18 percent of the records for women in these two groups showed mean daily calcium intake levels of less than 500 mg.; over half had mean intake levels under 600 mg. daily; and only 3 percent of those for pregnant women and 1 percent for lactating women showed a mean intake level equal to or exceeding the National Research Council recommendations.

A comparison of calcium intake levels for the preschool child, 2 to 5 years of age, by geographic area, showed that three-fourths of the diet records for the two-year olds had mean daily intake levels less than that recommended by the NRC and that intake levels were highest for the North Central Athapascan Indian child. At 3 to 5 years of age, in all areas, mean daily intake levels had not only decreased but the percentage of children with intakes under NRC recommended levels had increased significantly. Continued formula feeding of some children well into the second year of life probably accounts for the higher intake level at two years of age. The extreme variance between low and high calcium intakes in all villages might be interpreted, at least in part, as evidence of the variable importance given to milk as an item in the young child's diet. Family economics may also be a factor (Table E-1 Appendix).

TABLE 13.—PROPORTION OF CALCIUM FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village
In Milligrams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy	315	349	342	334	379	191	306	169	232	226	172
Egg	3	5	2	7	10	2	2	2	....	5	5
Meat	29	34	30	34	37	42	31	4	3	11	7
Fish	28	21	53	8	30	43	55	104	136	95	356
Fats as such	3	4	2	2	3	1	3	3	1	1	2
Fruit	18	11	17	5	23	10	8	8	6	7	2
Vegetables	7	20	7	10	18	11	14	5	5	5	7
Grain Products	214	193	194	246	118	163	158	217	265	253	212
Sugar Products	4	13	10	4	8	3	4	....	....	2	....
Miscellaneous	8	7	4	2	8	2	1	2	1	2	....
Per Capita Intake	629	657	661	652	634	468	582	514	649	607	763
Number of Records	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC(4)	99	100	99	100	100	99	100	100	99	100	100

TABLE 14.—PROPORTION OF CALCIUM FROM LOCAL AND IMPORTED FOODS

By Village
In Milligrams

Village	Number of Records	Mean Daily Intake	Local Foods	Import Foods	School Lunch	Vitamins	Mixed Foods
N. Central Athapascan							
Huslia	369	657	39	609	......	......	9
Allakaket	257	629	52	481	79	9	8
Northern Eskimo							
Noatak	462	661	81	533	40	......	7
Point Hope	362	652	41	532	76	......	3
Shishmaref	372	634	68	448	112	......	6
Shungnak	285	468	75	342	42	2	7
Southwestern Eskimo							
Akiak	228	582	77	416	79	......	10
Napaskiak	422	514	108	332	69	......	5
Kasigluk	351	649	132	463	43	......	11
Hooper Bay	1212	607	105	453	44	......	5
Newtok	247	763	368	341	54	......	0

SOURCE OF CALCIUM IN THE DIET

On a per capita basis, dairy products, chiefly canned evaporated milk, and grain products, both imported, accounted for three-fourths or more of the total dietary calcium at eight of the Eskimo and both Athapascan Indian villages. At the remaining Eskimo village of Newtok, fish was almost equally important as a source of this nutrient (Table 13).

As a matter of fact, fish was the only outstanding calcium source of local origin in these diets. It appeared to be a significant source on southwestern Eskimo diets particularly, supplying from about one-tenth of the total per capita intake at Akiak to almost one-half at Newtok. One or both of two small fishes, blackfish and needlefish, the latter sometimes mixed with fingerling of smelts, are available in varying amounts throughout the winter and early spring in this area. These fish, eaten whole, are more important in the diet of adults than that of children.

The only other significant source of fish calcium in most of the study villages was fish heads, chiefly salmon and whitefish. The cooked fresh product is popular during the summer and fall fish runs. Dried fish heads are used mostly as dog feed.

Small spicules of bone adhering to the flesh of dried fish may also be a source of some calcium in the diet, particularly in the southwest where dried fish is eaten almost daily during the greater part of the year. Unfortunately, there was no accurate way of measuring and recording this source.

Animal blood was a minor source of calcium on the diets. Some of the records in which it appeared were collected at Hooper Bay at a time when fresh seal blood was being used in the preparation of special soups. It did not appear in any of the other village records.

Blood soups and gravies are apparently not used as often today in the Eskimo and Indian diet as they were in the past. Although they may still be used in time honored ways at the hunting camps, it was not possible to collect dietary records there.

Milk was, of course, the primary imported source of calcium. It accounted for about one-fourth of the calcium in adult female diets; one-fifth in those of the adult male; about one-half in adolescent diets; and for more than one-half in diets of the 2 to 6 year old child (Tables E–2 through E–5, Appendix).

Bread and cereal products were also good sources of calcium. Pilot Bread and Jersey Creams, two types of ship's crackers, provided some calcium; the former appeared in the diets frequently. In addition, baking powder containing calcium was used in the preparation of some of the homemade breads, particularly in the southwest Eskimo villages.

The question which most often came to mind when reviewing calcium intakes was: what was the probable intake level in aboriginal times? Comparison of the calcium content of adult female diets at Hooper Bay (southwestern Eskimo) and Point Hope (northern Eskimo) showed fairly comparable mean daily intake levels, but Hooper Bay women obtained more than three times as much from local foods, chiefly from whole blackfish and needlefish. If we assume that Hooper Bay women are still using these foods to the maximum of their availability then the calcium intake must have been still lower in the Point Hope diet where these particular fish are not available and other calcium sources are limited. It should be pointed out that even at Hooper Bay the above mentioned fish sources are not continuously available throughout the year, nor are they so abundant that significant supplies can be dried or otherwise preserved for off-season use (Table E–2, Appendix).

According to older Eskimos in all the study villages greater use was made in the past of foods such as animal blood (mainly seal and caribou), crushed animal bones, fish heads, wildfowl eggs including the developing embryo, immature wildfowl, putrified fish products, stomach contents of moose and caribou and wild edible greens. These would have provided larger intakes of calcium for some Eskimos and Indians than they do in current diets. None of these foods, however, were constant or daily sources of dietary calcium but appeared on diets at specific seasons of the year, usually for relatively short periods. Even when available in storable quantities, they were used mostly as occasional food items. Further, the calcium present in some of the wild edible greens, such as sourdock, which contains oxalic acid, would not be completely available(20).

IRON

Mean daily iron intakes for all age groups and both sexes were well above the recommended levels. There was, however, a wide range in mean individual intakes—from less than 2 mg. to over 300 mg. daily. Adolescents of both sexes, and adult females had the highest percentage with intakes below the NRC standards (Table 15).

Data on iron intakes among children 2 to 5 years of age are presented separately in Table 16, in order to illustrate area dif-

TABLE 15.—IRON INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS
All Areas and Villages, All Seasons, By Age and Sex

Age-Sex Category	Number of Records	Iron Intakes		
		Mean Daily Intakes (mg)	Intake Range (mg)	Percent Under NRC(4)
Adult male 20-60 yrs	746	36.8	1.7-288.8	11.2
Adult Male 60 + yrs	112	26.2	3.8-197.5	15.1
Male 13-19 yrs	303	29.4	1.4-282.5	31.8
Adult Female 20-60 yrs	633	31.5	1.7-194.9	18.2
Adult Female 60 + yrs	120	24.1	2.0-119.5	39.5
Adult Female Pregnant	121	32.7	4.0-175.2	36.8
Adult Female Lactating	193	31.3	2.6-340.4	37.1
Female 13-19 yrs	298	24.4	3.8-197.5	43.6
School child 7-12 yrs	916	21.7	1.6-197.4	20.0
Preschool 2-6 yrs	843	15.5	1.5-189.0	17.8

ferences in adequacy of intake. About one-third of the diets for the southwestern Eskimo child were iron deficient by NRC standards, while diets of the northern preschool child showed less deficiency.

The highest percentage of diet records showing a deficiency in iron was found in the southwestern tundra villages of Napaskiak and Kasigluk where fish was the primary source of protein (Tables 17 and 18).

Scott et al(21) and Porter and Scott(22) found that the hemoglobin levels in both southwestern and northern Eskimo men and women were generally below accepted standards. The ICNND survey team(23) also found this to be true. In general, Scott and Heller(24) found iron therapy ineffective in raising hemoglobin levels except for a few cases in southwestern Alaska.

The consequences of the high iron intakes found in some of these diets are not known.

SOURCE OF IRON IN THE DIET

Meat was the major source of this nutrient at all the northern villages. It was a good but more limited source at Akiak, Hooper Bay, and Newtok in the Southwest. At the two remaining villages—Napaskiak and Kasigluk—the use of meat was limited to short seasonal periods when mink and wildfowl were available. For the major portion of the year the chief protein food was fish, much of it quite low in iron content.

There are, however, two small fishes—blackfish and needlefish—which are good sources of iron since they are eaten whole.

TABLE 16.—IRON INTAKES OF THE ALASKAN ESKIMO AND INDIAN CHILD 2–5 YEARS OF AGE
By Area
In Milligrams

Area	Number of Records	Iron Intake		
		Mean Daily Intake	Intake Range	Percent Under NRC(4)
Southwestern Eskimo	347	11.9	1.5–98.3	34
Northern Eskimo	197	23.7	3.8–88.1	5
Northcentral Athapascan	102	13.9	2.6–44.9	9
Totals	646	14.7	1.5–98.3	22

TABLE 17.—PROPORTION OF IRON FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village
In Milligrams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy	0.2	0.3	0.4	0.3	0.4	0.2	0.3	0.1	0.2	0.2	0.2
Egg	0.2	0.2	....	0.3	0.3	....	0.1	....	....	0.2	0.3
Meat	10.7	8.2	17.6	29.4	48.7	20.9	7.9	1.5	1.8	14.7	7.4
Fish	0.7	0.4	2.6	0.3	0.6	0.8	2.5	2.5	3.7	3.2	8.5
Fats as such	....	0.1	0.1	0.2	....	....	....	....	....	....	....
Fruits	1.3	0.4	0.7	0.3	1.2	0.5	0.3	0.2	0.3	0.3	....
Vegetables	0.5	0.9	0.5	0.6	0.9	0.6	0.7	0.2	0.2	0.4	0.4
Breads & Cereals	7.3	4.1	4.1	6.0	2.6	2.9	3.1	5.3	6.8	6.0	3.4
Sugar Products	0.2	1.0	0.5	0.3	0.7	0.2	0.3	....	....	0.1	....
Miscellaneous	0.3	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	....
Per Capita Intake	21.4	15.8	26.6	37.8	55.6	26.2	15.3	9.9	13.1	25.2	20.2
Number of Records	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC (4)	21	15	11	9	6	12	35	63	47	26	41

TABLE 18.—PROPORTION OF IRON FROM LOCAL AND IMPORTED FOODS
All Age and Sex Groups, All Seasons, By Village
In Milligrams

Village	Number of Records	Per Capita Intake	Iron Supply				
			Local Foods	Import Foods	School Lunch	Vitamins	Mixed Foods
N. Central Athapascan							
Allakaket	257	21.4	7.3	7.3	......	6.1	0.7
Huslia	369	15.8	7.1	7.9	......	......	0.8
Northern Eskimo							
Point Hope	362	37.8	27.9	7.5	0.5	......	1.9
Noatak	462	26.6	18.2	5.6	0.4	......	2.4
Shishmaref	372	55.6	48.7	5.2	1.2	......	0.5
Shungnak	285	26.2	19.5	4.1	0.6	0.1	1.9
Southwestern Eskimo							
Akiak	228	15.3	8.7	4.6	0.5	......	1.5
Napaskiak	422	9.9	3.8	5.4	0.5	......	0.2
Kasigluk	351	13.1	5.1	6.9	0.5	......	0.6
Hooper Bay	1212	25.2	17.4	6.7	0.4	......	0.7
Newtok	247	20.2	16.1	3.6	0.5	......	......

One or both are available during part of the winter at all southwestern villages.

The richest source of iron in these diets was the flesh of the various sea mammals: seal, ugruk, beluga whale, bowhead whale and walrus. The muscular tissue of these diving animals has a very high myoglobin content and therefore a high iron content. The use of these animals accounts for most of the extraordinarily high iron intake levels found in some of these diets. In general, these animals were an important food source only in coastal villages—Point Hope, Shishmaref and Hooper Bay—or villages whose inhabitants spend a significant part of the year on the coast (Noatak and Newtok). They were the most important meat source in the year round diet at Point Hope and Shishmaref.

Bread and cereal products were the only other significant sources of iron in these diets. The homemade breads were made with enriched flour; oatmeal was the most popular of the breakfast cereals; and macaroni, also made with enriched flour, was commonly used as a soup ingredient.

Local foods are still the major source of iron in the diets of all age groups and both sexes (Tables F-1 through F-3, Appendix).

VITAMIN A

Mean daily intakes of vitamin A were more than adequate in all age and sex categories, except for pregnant and lactating women (Table 19).

Individual mean daily intakes of this vitamin, however, were extremely variable—from a low of 40 to a high of 124,308 I.U. indicating that although there were excellent sources of vitamin A they were not consistently available throughout the year. A comparison of seasonal intake levels reveals that mean daily intakes during summer were significantly lower than at other seasons and that they were often below the National Research Council recommended intake levels. Mean daily intakes for adolescent boys and girls and for children 7 to 12 years of age were highest during the winter months. The greater share of their increased intakes at this season came from a multiple vitamin preparation given to those attending school in the Eskimo villages. Although the mean intake levels for the groups as a whole were found adequate, about 33 percent of the diets for the 7 to 12 year old children and 85 percent of those for lactating women were deficient in vitamin A content when compared with NRC recommendations (Table 19 and G–1, Appendix).

TABLE 19.—VITAMIN A INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS
All Areas and Villages, All Seasons, By Age and Sex Level

Age-Sex Category	Number of Records	Vitamin A Intake		
		Mean Daily Intake (I.U.)	Intake Range (I.U.)	Percent Under NRC(a)
Adult male 20–60 yrs	746	6800	83–106758	50.4
Adult male 60 + yrs	112	6459	583–31109	48.7
Male 13–19 yrs	303	7203	605–84882	47.4
Adult female 20–60 yrs	633	6445	241–124308	57.3
Adult female 60 + yrs	120	5279	605–27852	65.3
Adult female Pregnant	121	6292	355–31166	66.4
Adult female Lactating	193	4904	151–28919	85.3
Female 13–19 yrs	298	6587	583–31109	42.3
School child 7–12 yrs	916	6463	17–37383	36.7
Preschool 2–6 yrs	843	3771	40–33064	43.0

TABLE 20.—PROPORTION OF VITAMIN A FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village
In International Units

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy	482	563	588	508	533	295	494	344	342	352	292
Egg	95	113	33	143	155	50	55	51	....	119	115
Meat	1031	1659	1116	3458	3262	2012	851	183	112	1003	626
Fish	1088	325	2112	304	877	1135	988	1542	2826	1798	1764
Fats as such	515	477	1062	644	1409	959	536	862	132	317	1157
Fruits	1111	233	340	186	1276	395	330	246	406	281	29
Vegetables	236	430	741	81	2142	508	298	14	122	1344	....
Breads and Cereal	123	137	51	74	33	25	37	8	10	30	....
Sugar Products	5	....	....	....	....	....	....	....	....	....	....
Miscellaneous*	43	4	641	799	1409	890	988	998	939	729	798
Per Capita Intake	4729	3941	6684	6197	11096	6269	4577	4248	4889	5973	4781
No. of Records	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC(4)	59	65	31	44	10	37	58	76	46	48	59

* Includes vitamin preparations.

Since prolonged dietary deficiencies in the early years of life may have a profound effect on the growth rate and well being of the child, it was considered important to determine the vitamin A adequacy of the young child's diet at various age levels (2 to 3, 4 to 5 and 6 years).

Southwest Eskimo children were found to have the highest rate of deficiency. More than half of the diet records of Southwest Eskimo children 2 to 5 years of age were deficient in vitamin A. Although deficiency decreased at the 6 year age level, it was still higher in this area than in the North (Table G–2, Appendix).

SOURCE OF VITAMIN A

At the village level meat, fish, fats 'as such', fruits, vegetables, and dairy products provided most of the vitamin A. Meat was an important source in the North; fish in the Southwest. These two foods combined contributed from 40 to 60 percent of the total vitamin A intake with 90 percent or more from local foods. In addition, a portion of the vitamin A from fats 'as such' also came from these two food products. In adult male and female diets, almost three-fourths of the vitamin A from fats 'as such' was of local origin, most of it being derived from sea mammal oils. When handled carefully to prevent rancidity, these oils are a good source of vitamin A.

Sea mammal oils were in greater supply at the coastal villages. Some of the vitamin A attributed to fish and most of it from the fruit category actually came from this source as seal oil is often used in special preparations of these foods.

Seal and fish livers are other excellent local sources of vitamin A and salmon is the best fish source of this nutrient. In the southwest village of Napaskiak salmon appeared almost daily on the diet throughout the greater part of the year. It was an important vitamin A source, although to a lesser extent, in the other southwest villages except Newtok.

The most popular fish liver sources of this nutrient were whitefish (Kasigluk), pike (Akiak), blackfish (all 5 southwest villages), ling cod (often called mudshark at Shungnak), and tom cod liver (Hooper Bay and Newtok).

Milk was a moderate source of vitamin A at most villages but vegetables were important at only two villages—Shishmaref and Hooper Bay. Sourdock was an important green vegetable in both villages, and willow leaves provided an additional source in Shishmaref. The use of canned vegetables was limited in all villages but they appeared more frequently in Indian than in Eskimo diets. The preferred canned vegetable was corn.

A multiple vitamin preparation, given school children as part of the school lunch in Eskimo villages, was an important source of vitamin A for them. Occasionally vitamin preparations were used by other family members but only on an erratic basis. Most of the vitamin A in home diets in Allakaket was obtained from such preparations, due to the efforts of the resident missionary nurse who dispensed them and encouraged their use.

The percentage of diets deficient in vitamin A was fairly high in all villages except Shishmaref. In addition to the greens already mentioned this village had excellent supplies of ugruk oil which they used generously throughout the year. This village obtained twice as much or more vitamin A from local food resources than the other villages (Tables 20 and 21).

Local foods were the major source of vitamin A in adult diets. They accounted for about one-third of the vitamin A in the adolescent's and the school child's diets—and for about one-half of it in the 2 to 6 year old child's diet (Tables G–3 through G–5, Appendix).

TABLE 21.—PROPORTION OF VITAMIN A FROM LOCAL AND IMPORTED FOODS

All Age and Sex Groups, All Seasons, By Village
In International Units

Village	Number of Records	Per Capita Intake	Vitamin A Source				
			Local Foods	Import Foods	School Lunch*	Vitamins**	Mixed Foods
Northcentral Athapascan							
Allakaket	257	4729	1393	1732	4	1460	140
Huslia	369	3941	1628	1889	....	243	181
Northern Eskimo							
Point Hope	362	6197	3928	1055	900	110	204
Noatak	462	6684	3963	1020	1012	560	129
Shishmaref	372	11096	7085	1960	1872	30	149
Shungnak	285	6269	3437	1111	939	611	171
Southwestern Eskimo							
Akiak	228	4577	1734	1011	1507	64	261
Napaskiak	422	4248	1730	988	1322	.....	208
Kasigluk	351	4889	2868	439	1180	46	356
Hooper Bay	1212	5973	3941	541	1092	103	296
Newtok	247	4781	3464	322	917	63	15

* Includes pharmaceutical source given at school.
** Pharmaceutical source given at home.

The ICNND nutrition survey team(23) found very few of those tested with deficient or low serum vitamin A and carotene values.

THE B-VITAMINS

The results of the thiamine, riboflavin and niacin excretion tests performed by the ICNND survey team(23) indicate that most had values within the "acceptable" or "high" range. Newtok people, who were subsisting almost entirely on stored dried fish products at the time of the ICNND visit, had the lowest recorded values for thiamine. Our study shows that the mean per capita intake of thiamine was also lowest at this village (Table 23).

I. Thiamine

The mean daily thiamine intake for all age and sex groups was equal to or exceeded that recommended by the National Research Council. However, about one-third of the diets of children 7 to 12 years of age, and almost three-fourths of those for lactating women were deficient by these standards. As in the case of some of the other nutrients, although some excellent sources of thiamine were available their availability was not consistent (Table 22).

TABLE 22.—THIAMINE INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS
All Areas and Villages, All Seasons by Age and Sex

Age-Sex Category	Number of Records	Thiamine Intake		
		Mean Daily Intake (mg.)	Intake Range (mg.)	Percent Under NRC(4)
Adult male 20–60 yrs	746	1.625	.035–13.906	55.1
Adult male 60 + yrs	112	1.308	.048–6.700	58.8
Male 13–19 yrs	303	2.160	.245–5.847	45.8
Adult Female 20–60 yrs	633	1.399	.073–10.603	44.4
Adult Female 60 + yrs	120	1.188	.208–11.088	54.8
Adult Female Pregnant	121	1.573	.274–10.124	56.0
Adult Female Lactating	193	1.462	.032–4.977	70.1
Female 13–19 yrs	298	2.088	.048–6.700	37.1
School Child 7–12 yrs	916	2.140	.035–5.609	32.5
Preschool 2–6 yrs	843	1.210	.033–5.075	37.5

TABLE 23.—PROPORTION OF THIAMINE FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village
In Milligrams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allaka-ket	Huslia	Noatak	Point Hope	Shish-maref	Shung-nak	Akiak	Napask-iak	Kasig-luk	Hooper Bay	Newtok
Dairy	.131	.072	.069	.065	.073	.040	.053	.030	.050	.039	.034
Egg	.008	.007	.002	.012	.012	.004	.003	.001	....	.010	.010
Meat	.384	.289	.482	.435	.392	.631	.228	.052	.034	.156	.108
Fish	.265	.082	.115	.017	.111	.234	.342	.452	.545	.352	.134
Fats as such	.004	.017	.015	.007	.010	.004	.007	....	....	.002	.001
Fruits	.060	.023	.043	.010	.048	.022	.036	.016	.027	.046	.005
Vegetable	.045	.069	.023	.031	.051	.038	.043	.006	.011	.021	.009
Breads & Cereals	.952	.549	.593	.722	.351	.411	.541	.547	.685	.668	.426
Sugar Products	.004	.002	.003	.005	.001	.002	.003	....	....	....	....
Miscellaneous	.024	.009	.301	.394	.656	.442	.462	.340	.418	.334	.370
Per Capita Intake	1.877	1.119	1.646	1.698	1.705	1.828	1.718	1.444	1.770	1.628	1.097
Percent Under NRC (4)	52	63	35	38	44	38	43	54	33	43	78
No. of Records	257	369	462	362	372	285	228	422	351	1212	247

SOURCE OF THIAMINE

Analysis of per capita village sources revealed that imported foods were a major source of this nutrient in most Eskimo and Indian diets, primarily from bread and cereal products. They provided from about one-fourth of the total per capita intake in Shungnak to about one-half of it in Allakaket (Tables 23 and 24).

Meat and fish were the chief local sources of this nutrient. Meats were the important source in the north, and fish in the southwestern villages.

Vitamin preparations were a major source of thiamine in the Eskimo villages (coded under miscellaneous on Table 23), but only for the child who received a multiple vitamin preparation in the school lunch program.

From our records, it appeared that neither meat nor fish was an outstanding thiamine source in Newtok. However, very few records were collected at the time of the year when meat was available in this area. Yet, muskrat, seal and wildfowl were seasonally important foods in this village. Most of the Newtok diet records were collected in late fall and winter when dried or "poke" fish (herring) were the most common protein foods, accounting

TABLE 24.—PROPORTION OF THIAMINE FROM LOCAL AND IMPORTED FOODS

All Age and Sex Groups, All Seasons, By Village

Village	Number of Records	Per Capita Intake	Thiamine Source				
			Local Foods	Import Foods	School Foods	Vitamins*	Mixed Foods
N. Central Athapascan							
Allakaket	257	1.877	0.327	0.653	0.021	0.844	0.032
Huslia	369	1.119	0.288	0.694	....	0.105	0.032
Northern Eskimo							
Point Hope	362	1.698	0.409	0.808	0.418	0.032	0.031
Noatak	462	1.646	0.495	0.644	0.317	0.104	0.086
Shishmaref	372	1.705	0.489	0.468	0.705	0.009	0.034
Shungnak	285	1.828	0.691	0.420	0.452	0.195	0.070
Southwestern Eskimo							
Akiak	228	1.718	0.521	0.630	0.509	......	0.058
Napaskiak	422	1.444	0.494	0.569	0.362	......	0.019
Kasigluk	351	1.770	0.563	0.716	0.422	0.018	0.051
Hooper Bay	1212	1.628	0.492	0.689	0.347	0.055	0.045
Newtok	247	1.097	0.238	0.444	0.403	0.011	0.001

* From vitamin preparations taken at home. Those given at school are included under school.

for three-fourths of the total protein intake on adult diets (Tables 23 and 24).

Unequal distribution and use of local food resources throughout the year probably accounts for some of the variable thiamine intakes in all villages. High intakes were recorded more frequently when supplies of fresh meat were abundant. Fresh foods are especially relished after prolonged periods of dried products on the menu, or when rations have been limited for some time. When first plentiful, the fresh foods are often eaten in larger than normal quantities. Extremely low thiamine intakes occurred chiefly in the southwest tundra villages, usually during periods when dried fish was the major protein food. In this area fish provided from about 46 percent of the total protein at Akiak to about 83 percent at Kasigluk. In contrast, at the northern villages fish protein provided as little as 9 percent of the total at Point Hope to about 36 percent at Noatak.

Several of the food fishes used in significant amounts on southwestern Eskimo diets, namely blackfish, herring and smelts, were found to be low in thiamine. The most common specie of herring used in Alaskan Eskimo diets, *Clupea harrengus*, has been found to contain thiaminase, the enzyme which destroys thiamine. Certain species of whitefish, smelt and ling cod, belonging to the same genus as those found in Alaska have also been found to contain the enzyme(25). This is of particular interest since some of these fish are usually eaten raw frozen or raw dried. In southwest Eskimo diets, for example, one-half or more of the fish protein came from the raw, dried product (Napaskiak-salmon, Kasigluk-salmon and whitefish, Newtok-herring), mostly the fillet portion although the skin was also eaten. At Hooper Bay and Akiak one-fourth or more of the fish protein came from the raw, frozen product, the greater share of it from a combination of whitefish, blackfish, or needlefish. At the northern villages of Allakaket, Noatak and Shungnak, approximately one-third of the protein came from fish and at Allakaket and Shungnak one-half or more of it came from the raw product (Table 76, Chapter V).

According to the ICNND Study(23), urinary thiamine excretion values were found to be within the acceptable to high range except for women at the tundra village of Newtok who had extreme low values. Generally, the values for children were higher than for adults in all study villages except at the two Indian villages of Huslia and Allakaket. The multiple vitamin preparation given the Eskimo children as part of their school lunch undoubtedly accounted for this.

The only significant regional differences in thiamine intake noted in the 2 to 6 year age group were (1) occasional extremely low thiamine intakes in the southwestern area, especially in Newtok as has been pointed out and (2) much lower mean daily intakes and higher percentages of deficiency among Athapascan Indian children at the six year age level. The school lunch served at the Eskimo schools and the multiple vitamin preparation given them probably accounts for their higher mean daily intake (Table H–1, Appendix).

Imported foods accounted for over half of the mean daily thiamine intake at all age and sex levels. Breads and cereal products were the most important source for all groups except children attending school. For them pharmaceutical vitamin preparations contributed the greatest amount. The only other significant thiamine sources were meat and fish which served as important sources for all age and sex groups, but especially for the adult male (Tables H–2 and H–3, Appendix).

II. Riboflavin

Mean daily intakes of riboflavin at the various age levels and for both sexes were also more than adequate when compared with the National Research Council recommended allowances.

TABLE 25.—RIBOFLAVIN INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS
All Areas and Villages, All Seasons, By Age and Sex
In Milligrams

Age-Sex Category	Number of Records	Riboflavin Intake		
		Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC(*)
Adult male 20-60 yrs	746	2.990	.357-17.372	28.9
Adult male 60 + yrs	112	2.541	.488-9.329	36.1
Male 13-19 yrs	303	3.122	.201-10.312	40.6
Adult Female 20-60 yrs	633	2.625	.309-11.231	25.7
Adult Female 60 + yrs	120	2.093	.388-11.365	44.4
Female Pregnant	121	2.727	.528-11.688	41.6
Female Lactating	193	2.481	.447-10.124	61.4
Female 13-19 yrs	298	2.922	.488-9.329	37.5
School Child 7-12 yrs	916	2.981	.250-7.975	25.6
Preschool 2-6 yrs	843	1.914	.306-7.483	25.6

TABLE 26.—PROPORTION OF RIBOFLAVIN FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village
In Milligrams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy	.697	.494	.370	.470	.529	.267	.423	.242	.358	.312	.261
Egg	.020	.021	.006	.030	.038	.008	.011	.006	....	.028	.025
Meat	.667	.603	1.333	1.518	1.441	2.449	.540	.102	.091	.415	.276
Fish	.354	.108	.671	.161	.158	.353	.870	.572	1.124	.730	1.302
Fats	.002	.009	.006	.006	.006	.004	.005	....	....	....	....
Fruits	.074	.017	.026	.012	.057	.023	.019	.016	.024	.027	.005
Vegetables	.028	.047	.020	.018	.095	.026	.033	.006	.007	.058	.008
Breads et al	.428	.288	.243	.430	.192	.214	.352	.352	.426	.403	.279
Sugars et al	.004	.005	.006	.006	.003	.004	.005	....	....	....	....
Miscellaneous	.025	.016	.211	.379	.649	.410	.469	.347	.419	.330	.378
Per Capita Intake	2.299	1.608	2.892	3.030	3.168	3.758	2.727	1.643	2.449	2.303	2.534
No. of Records	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC (4)	44	57	2	16	13	11	20	64	28	31	34

However, one-fourth or more of the riboflavin intakes for all age groups and both sexes were below the National Research Council recommendations, with lactating women having the highest percent deficiency by these standards (Table 25).

Source of Riboflavin in the Diet

Meat was the major source of this nutrient in the northern villages and fish in the Southwest. Milk and bread products were also significant sources of this nutrient in most villages although their use varied from village to village. Judicious use of four food groups—milk, meat, fish and bread products—should assure an adequate intake for all age and sex groups. The use of dried milk powder in the preparation of the varieties of homemade bread, including hotcakes, would be particularly desirable in villages like Napaskiak, where the supply of fresh meat and fish products is limited during the greater part of the year (Tables 26 and 27).

Pharmaceutical vitamin preparations were an important source of this vitamin for the Eskimo school child (Tables I-1 through I-3, Appendix).

TABLE 27.—PROPORTION OF RIBOFLAVIN FROM LOCAL AND IMPORTED FOODS
All Age and Sex Groups, All Seasons, By Village
In Milligrams

Village	Number of Records	Per Capita Intake	Riboflavin Source				
			Local Foods	Import Foods	School Lunch	Vitamins	Mixed Foods
Northcentral Athapascan							
Allakaket	257	2.299	0.634	0.735	0.120	0.757	0.053
Huslia	369	1.608	0.575	0.889	....	0.088	0.056
Northern Eskimo							
Noatak	462	2.892	1.808	0.620	0.179	0.059	0.226
Point Hope	362	3.030	1.559	0.862	0.458	0.032	0.119
Shishmaref	372	3.168	1.606	0.686	0.792	0.008	0.076
Shungnak	285	3.758	2.359	0.452	0.486	0.219	0.242
Southwestern Eskimo							
Akiak	228	2.727	1.288	0.756	0.580	......	0.103
Napaskiak	422	1.643	0.657	0.521	0.437	......	0.028
Kasigluk	351	2.449	1.174	0.732	0.462	0.015	0.066
Hooper Bay	1212	2.303	1.150	0.669	0.383	0.052	0.049
Newtok	247	2.534	1.585	0.477	0.460	0.011	0.001

III. Niacin

Mean daily niacin intakes were high for all age groups and both sexes, and relatively few diets showed deficiencies of this nutrient (Table 28).

Meat was the major source of niacin in northern diets and fish in those of the Southwest. Bread products contributed significantly to the total intake in all villages since enriched flour was used in the preparation of the homemade varieties (Tables 29 and 30). Pharmaceutical vitamin preparations were an important source but their use was largely confined to the Eskimo child of school age (Tables J–1 through J–3, Appendix).

ASCORBIC ACID

Mean ascorbic acid intakes below National Research Council recommendations were high at all age and sex levels. Three-fourths or more of all diets were deficient by these standards (Table 31). A review of the ascorbic acid intake level in the diet of the child aged 2 to 5 years, revealed that deficiencies were high in all three geographical areas but that the percent with "no" ascorbic acid was highest among southwest Eskimos (36 percent) (Table 32).

TABLE 28.—NIACIN INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS
All Areas and Villages, All Seasons, By Age and Sex

Age-Sex Category	Number of Records	Niacin Intake		
		Mean Daily Intakes (mg)	Intake Range (mg)	Percent Under NRC(4)
Adult male 20–60 yrs	746	41.1	8.6–136.8	10.3
Adult male 60 + yrs	112	35.3	4.7–96.2	13.4
Male 13–19 yrs	303	37.4	6.2–102.7	15.9
Adult Female 20–60 yrs	633	34.6	6.8–131.7	10.7
Adult Female 60 + yrs	120	29.2	8.8–119.0	15.3
Adult Female Pregnant	121	37.9	10.1–112.1	15.2
Adult Female Lactating	193	37.4	28.4–158.8	11.7
Female 13–19 yrs	298	32.6	4.7–96.2	10.4
School Child 7–12 yrs	916	30.2	3.9–77.3	10.9
Preschool 2–6 yrs	843	19.9	1.6–85.5	13.0

TABLE 29.—PROPORTION OF NIACIN FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village
In Milligrams

Food Group	N. Central Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allaka-ket	Huslia	Noatak	Point Hope	Shish-maref	Shung-nak	Akiak	Napask-iak	Kasig-luk	Hooper Bay	Newtok
Dairy	0.4	0.3	0.4	0.3	0.4	0.2	0.3	0.1	0.3	0.2	0.2
Egg	......	......	......	......	......	......	......	......	......	......	......
Meat	13.3	12.1	13.7	16.0	20.8	18.2	10.4	2.2	1.5	7.9	4.7
Fish	8.0	3.8	10.9	1.3	2.5	9.5	16.5	24.9	28.7	12.7	15.4
Fats	0.1	0.1	0.2	0.2	0.2	0.1	0.2	......	......	......	......
Fruits	0.7	0.3	0.5	0.2	0.9	0.3	0.2	0.2	0.5	0.3	......
Vegetables	0.5	0.9	0.3	0.3	0.6	0.5	0.7	0.1	0.1	0.3	0.1
Breads	5.4	3.4	4.6	5.9	2.6	3.4	3.4	5.1	6.9	6.3	4.7
Sugar	......	0.1	0.3	......	......	......	0.1	......	......	......	......
Miscellaneous	0.4	0.2	1.9	2.6	4.4	2.5	3.0	2.3	2.8	2.2	2.5
Per Capita Intake	28.8	21.2	32.8	26.8	32.4	34.7	34.8	34.9	40.8	29.9	27.6
Number of Records	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC(4)	23	22	11	23	13	8	10	7	3	21	22

TABLE 30.—PROPORTION OF NIACIN FROM LOCAL AND IMPORTED FOODS

All Age and Sex Groups, All Seasons, By Village
In Milligrams

Village	Number of Records	Per Capita Intake	Niacin Intake				
			Local Foods	Import Foods	School Lunch	Vitamins	Mixed Foods
N. Central Athapascan							
Allakaket	257	28.8	16.5	6.1	0.1	5.4	0.7
Huslia	369	21.2	13.9	5.9	....	0.7	0.7
Northern Eskimo							
Point Hope	362	26.8	15.6	6.9	2.9	0.3	1.1
Noatak	462	32.8	21.8	5.9	2.1	0.7	2.3
Shishmaref	372	32.4	22.5	4.2	4.8	0.1	0.8
Shungnak	285	34.7	24.1	3.9	3.4	1.3	2.0
Southwestern Eskimo							
Akiak	228	34.8	25.6	4.7	3.6	......	0.9
Napaskiak	422	34.9	26.8	5.2	2.5	......	0.4
Kasigluk	351	40.8	29.5	6.9	3.0	0.1	1.3
Hooper Bay	1212	29.9	19.5	6.2	2.5	0.3	1.4
Newtok	247	27.6	19.8	4.9	2.8	0.1	......

It should be pointed out that our figures are based on 'measurable' ascorbic acid only. The flesh and vital organs of both sea and land mammals, in many of these diets, may be a source of this nutrient. They should have ascorbic acid values at least equivalent to that normally present in the blood of the particular species used. There is at present no satisfactory method for determining the ascorbic acid content of these products.

Fall and summer diets had the highest ascorbic acid content. During these seasons the mean daily intake for children 2 to 6 years of age was equal to that recommended by the National Research Council. This was not true of other age groups whose diets showed a high rate of deficiency at all seasons (Table K–1, Appendix).

Boys and girls age 7 to 19 had the highest mean daily intakes during the winter season, equal to twice that for adults. The majority of children in this age group were attending village schools. In the Eskimo villages, a multiple vitamin preparation was included as part of the school lunch program. Most of the ascorbic acid credited specifically to the school lunch was from this source. Except in the Indian village of Allakaket such vitamin preparations were not an important ascorbic acid source in the

TABLE 31.—ASCORBIC ACID INTAKES ON ALASKAN ESKIMO AND INDIAN DIETS

All Areas and Villages, All Seasons, By Age and Sex
In Milligrams

Age-Sex Category	Number of Records	Ascorbic Acid Intake		
		Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC(*)
Adult male 20-60 yrs	746	30	0-388	86.6
Adult male 60 + yrs	112	24	0-392	86.6
Male 13-19 yrs	303	47	0-387	86.4
Adult Female 20-60 yrs	633	31	0-301	84.9
Adult Female 60 + yrs	120	23	0-294	94.4
Adult Female Pregnant	121	32	0-456	90.4
Adult Female Lactating	193	28	0-441	97.0
Female 13-19 yrs	298	49	0-392	85.0
School Child 7-12 yrs	916	44	0-442	75.1
Preschool 2-6 yrs	843	30	0-441	75.8

home. At Allakaket they provided almost half of the per capita village intake of this vitamin.

Mean per capita intakes of ascorbic acid by village were extremely variable. The highest values, and they were fairly comparable, were at three widely separated villages—Allakaket, Shishmaref and Hooper Bay. At the latter village more than three-fourths of the ascorbic acid came from local food sources; these sources provided about one-half of the total intake in Shishmaref. In both villages wild edible greens and berries are available in good quantities most years. At Shishmaref many families still store good supplies of greens, chiefly willow leaves and sourdock. At Hooper Bay only small amounts of greens are stored for winter use, but most families manage to store considerable quantities of cloudberries. These foods provided four-fifths of the per capita ascorbic acid in Hooper Bay diets and about one-half at Shishmaref. These two villages had the highest per capita ascorbic acid intake—about 50 mg. (Table 34).

Local foods appeared to be a negligible source of ascorbic acid at Point Hope. Wild edible greens, mostly from *Parrya nudicaulis* at the village site, and sourdock at inland camp sites, and berries are used nowadays in minimal amounts only. Point

TABLE 32.—ASCORBIC ACID INTAKES OF ALASKAN ESKIMO AND INDIAN CHILDREN 2–5 YEARS OF AGE
By Area, By Age Level

Geographical Area	Number of Records	Number and Intake Level			
		No Measurable Ascorbic Acid	Under 15 mg.	Total Under NRC(4)	Percent Under NRC(4)
Northcentral Athapascar	102	2	56	76	75
Northern Eskimo	197	42	127	159	81
Southwestern Eskimo	347	126	211	274	78
Total	646	170	394	509	79

Hope, however, has about the best year-round supply of fresh meat products of any of the 11 study villages. Seal, ugruk, bowhead whale, polar bear, caribou, wild fowl and in some years, beluga whale and walrus are available. At any given time throughout the year, one or more of these foods is usually available fresh (Table 34).

In spite of the dietary changes that have taken place, scurvy is rarely seen. The very few cases reported in the past two decades have been in neglected infants.

From a comparison of ascorbic acid sources among the various age groups and for both sexes, we find that local foods provided most of the adult intake of this vitamin. Local foods provided about one-half of the intake of adolescent females and children 2 to 6 years of age. About one-third of the total ascorbic acid intake of youngsters 7 to 12 years and of males 13 to 19 years of age came from these foods. Multiple vitamin preparations given at school (in Eskimo villages only) provided almost half of the ascorbic acid in the diets of children 7–19 years of age (Tables K–1 through K–4, Appendix).

The ICNND survey team(23) found that about one-third of those tested in southwest Alaska and about one-tenth of those tested in northern Alaska had low serum ascorbic acid values. Over half of the individuals tested at Kasigluk, and about one-third each at Newtok and Hooper Bay and approximately one-fourth each at Akiak, Point Hope and Huslia, had serum ascorbic acid values of less than 0.2 mg/100 ml.

TABLE 33.—PROPORTION OF ASCORBIC ACID FROM SELECTED FOOD GROUPS
All Age and Sex Groups, All Seasons, By Village
In Milligrams

Food Group	Northcentral Athapascan		Northern Eskimo				Southwestern Eskimo				
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Napaskiak	Kasigluk	Hooper Bay	Newtok
Dairy	0.5	0.4	0.2	0.3	0.3	0.1	0.3	0.2	0.3	0.3	0.2
Eggs	......	......	......	......	......	......	......	......	......	......	......
Meat	0.3	0.1	0.1	1.0	0.1	0.2	0.5	0.3	......	......	......
Fish	......	......	......	......	......	......	......	......	1.5	0.1	......
Fats as such	......	......	......	......	......	......	......	......	......	......	......
Fruits	36.8	6.2	31.0	2.5	21.4	10.2	17.5	7.3	15.4	43.0	3.4
Vegetable	5.0	6.9	5.8	2.2	17.8	4.3	6.5	0.5	1.2	5.9	......
Breads and Cereals	......	......	......	......	......	......	......	......	......	......	......
Sugar Products	......	......	......	......	......	......	......	......	......	......	......
Miscellaneous	6.0	3.3	6.0	6.9	12.3	9.1	9.1	6.7	7.6	5.9	6.6
Per Capita Intake	49	17	43	13	52	24	34	15	26	55	10
Number of Records	257	369	462	362	372	285	228	422	351	1212	247
Percent Under NRC(4)	72	96	77	98	72	90	80	97	90	70	96

TABLE 34.—PROPORTION OF ASCORBIC ACID FROM LOCAL AND IMPORTED FOODS

All Age and Sex Groups, All Seasons, By Village

In Milligrams

Village	Number of Records	Mean Per Capita Intake	Ascorbic Acid Source			
			Local Foods#	Import Foods	School Lunch*	Vitamins**
Northcentral Athapascan						
Allakaket	257	49	5	24	....	20
Huslia	369	17	3	11	....	3
Northern Eskimo						
Point Hope	362	13	1	4	7	1
Noatak	462	43	22	9	10	2
Shishmaref	372	52	27	8	16	1
Shungnak	285	24	4	4	11	5
Southwestern Eskimo						
Akiak	228	34	16	5	13	....
Napaskiak	422	15	6	2	7	....
Kasigluk	351	26	15	2	8	1
Hooper Bay	1212	55	44	2	8	1
Newtok	247	10	3	<1	7	<1

* Includes vitamin preparations given at school.

** Vitamins given at home, only.

# Includes that from mixed food preparations since it is from local food sources.

THE DIET OF THE INFANT

INTRODUCTION

Of all age groups infants are probably the most vulnerable to inadequate nutrition. Moyer et al(26) states that the "growth and development of an organism as a whole implies the continuous, active participation of all the necessary food nutrients and the surrounding environment; that it is essential that dietaries be scientifically planned considering season, environment, the variability of the foods and differences in age, size, activity, sex, race, nutritive state and physiological activity, in order that chemical requirements be met at all times." For the normal infant, adequate nutrition is achieved by feeding a combination of foods—increasing in amount and in complexity as the child grows and develops—that contains an adequate supply of all essential nutrients in a form that is easily digestible and assimilable.

A question of major concern to medical and health personnel charged with the health supervision of Alaska's Eskimo, Indian and Aleut peoples is: How have the cultural changes, which have increased in tempo since World War II, affected the feeding practices of the infants? With this question in mind, the 555 food intake records, covering 3 to 7 days each, collected for infants under 2 years of age, were analyzed to delineate present day feeding practices and to assess the nutritional adequacy of the diets.

PAST INFANT FEEDING PRACTICES

Only casual references to infant feeding practices are included in early accounts of the Alaskan Eskimo and Indian people. The older women in our study villages were, therefore, questioned about early day practices. A resume of the information obtained through these interviews is presented in the following paragraphs. Most of this information was obtained in the villages of Napaskiak and Akiak which had a larger percentage of older women than the other study villages.

After delivery, infants were fed neither colostrum nor the "first milk" from the mother's breast; the latter was considered too watery. Infants were generally breast-fed until the next child was born, or until the child was two years of age or older. If an infant was being breast-fed at the time the next sibling was born, the first flow of milk from the mother's breast after delivery—yellowish in color—was discarded since it was considered to be "old milk" and not suitable. Thereafter, one or both children were fed the regular breast flow.

There were very few food taboos for the mother during pregnancy or lactation, and the few in force apparently varied from one locality to another. One of the informants mentioned that during lactation mothers were advised to eat only cooked foods, never raw meat or fish. Cloudberries were not recommended for the first week or two following delivery, for if eaten at this time, they were believed to cause the breasts to dry up. Once lactation was well established, they could be eaten safely. It was apparently a universal practice for lactating mothers to drink fish and meat broth liberally, but otherwise they ate as usual.

If the breast milk was insufficient, the mothers frequently chewed fish livers to a watery pulp and fed this to the baby. This method of infant feeding together with liberal feedings of fish and meat broth, was also used if the mother died. One informant believed that infants did very well on this regime.

Supplemental foods were added to the diets as soon as the infant could hold its head up. The regular family foods were prechewed and passed directly from the mother's mouth into that of the child. Again, premasticated fish liver, especially that from the tom cod, ling cod, or whitefish, was one of the first supplemental foods used. At Unalakleet an early practice was to simmer the tom cod livers in a small amount of water. As the oil escaped and rose to the surface it was carefully scooped off and fed to infants. Frequently, a piece of blubber, carefully secured so the child could not swallow it or choke on it, was given to the child, usually as a pacifier. One infant in this study received a mixture of fats called 'baby agutuk' at about one month of age. This agutuk consisted of a mixture of hydrogenated fat and moose tallow. In former times it would have been moose or caribou tallow and seal oil. Use of such special mixtures was apparently a common practice among the tundra Eskimo of southwestern Alaska. Brandt(17) reported that at Hooper Bay, the white fatty kernel present in the yellow knob above the bill of the male king eider duck was fed to the youngest babies. As soon as teeth developed, the child was given other family foods.

Because premastication of infant foods was considered a possible means of transmitting disease from mother to child, this method of infant feeding was discouraged by health workers. While the practice may persist in some remote villages, it is not widespread today.

FINDINGS OF PRESENT STUDY

Source of Milk in Infant Diets: According to the 555 diet records collected for infants under two years, cow's milk (canned, evaporated) was the only source of milk in 63 percent, breast milk the sole source in 21 percent, and a combination of breast and cow's milk in the remaining 16 percent. At 1 month of age, the records show that 69 percent of these infants were wholly breast fed and 7 percent partially so. At 2 months of age the percentages were 62 and 24 respectively. By three months of age the number wholly formula fed (38 percent) exceeded those wholly breast fed (25 percent). The proportion fed entirely by formula gradually increased and by 13–18 months, 80 percent were receiving formulas; this increased to 91 percent by 19–23 months. (See Fig. 1 and Table 35).

The formula usually consisted of a mixture of half evaporated milk and half boiled water. Occasionally an infant was given a much more dilute formula. When questioned some of the mothers stated that they were following instructions given them by hospital personnel or the public health nurse. These instructions were followed long after a more concentrated mixture should have been used. Another less frequent explanation was that the family or village supply of evaporated milk was inadequate. Milk is generally scarce in late winter and spring when family cash is usually low or exhausted. The village supply of milk is often de-

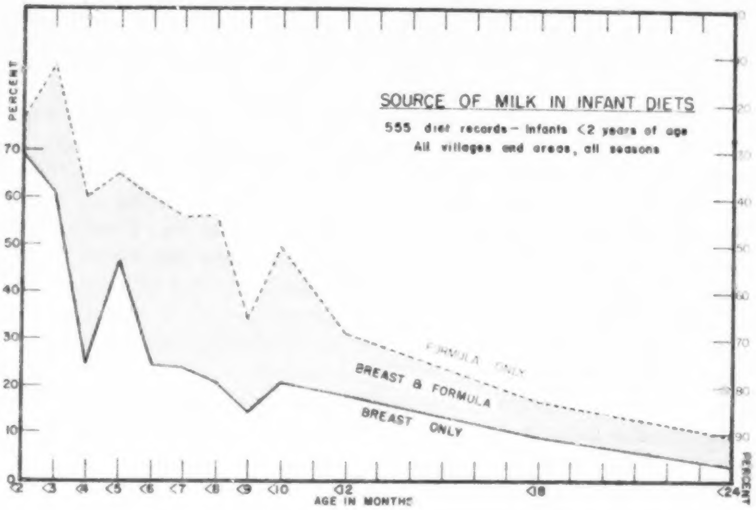

TABLE 35.—SOURCE OF MILK
555 Diets: Breast and Formula-Fed Infants <2 Years
By Age

Food Category	Age in Months					
	1-3	4-7	8-12	13-18	19-23	Total
Breast only	36	18	10	3	....	67
Breast & Bottle	20	28	25	12	5	90
Breast & Other Supplements	8	10	15	11	4	48
Bottle only	10	13	9	3	....	35
Bottle & Other Supplements	12	25	73	107	94	311
Not on Breast or Bottle (cup)	....	....	....	....	4	4
Total No. Records	86	94	132	136	107	555

pleted at this time as well, pending the arrival of the annual supply boat. Most villages, however, now have weekly plane service, and small supplies of milk can be flown in if the weather is good, although at considerable cost. The infant's need for milk is usually given priority during these emergencies, and available supplies are reserved for them. Local storekeepers will usually allow credit for purchase of milk for infants, where they may not extend credit for other items.

Current Infant Feeding Practices: Demand feeding is the universal practice whether the infant is fed by breast or by formula. As with most well-fed infants, Eskimo and Indian babies eventually put themselves on a 3½ to 4 hour feeding schedule. Night feedings, particularly those given in the late evening and early morning hours, sometimes continue until the child is two years of age or even older. Eskimo mothers, in particular, tend to give the breast or formula whenever the child whimpers or cries. This is an old custom, for by tradition Eskimo children have always been indulged in their demands.

Certain observed practices in the bottle feeding of Eskimo and Indian infants lead one to believe that instruction in the proper handling of the bottle and nipple and other utensils used in feeding infants has not kept pace with the increased use of this method.

Generally, the water was boiled, but it was not unusual to see partially filled formula bottles picked up from dirty beds and floors and given to the small infant, sometimes after a toddler had been sucking on it. Opportunities for contamination of bottle and nipple in Eskimo and Indian homes are numerous. Dirt is inevitably brought in from outdoors on the footgear of those responsible for feeding dogs as well as by others. In some villages the dog population exceeds the human population. Although the dogs are tethered in a designated area, pregnant female dogs are usually given shelter in the long entrances or on the porches through which flows most of the traffic into and out of the house. Maintaining proper sanitation practices in the home is difficult at best because of the lack of a safe water supply, running water and adequate refrigeration.

Breast feeding up to three or even five years of age has been reported as a common practice among early Eskimos. This practice, in modified form, has been carried over to the formula fed infant. While only three records of children in this study showed breast feeding beyond 24 months of age, there were 105 records of children over two years of age still receiving part of their milk from the bottle. Most of these records were for children receiving family diets, and the formula, usually given in the late evening or early morning, may have served only as a pacifier.

Prolonged breast or formula feeding has no adverse nutritional consequences if adequate supplementary foods are given. According to our records, however, some infants up to 13 months

TABLE 36.—AVERAGE DAILY INTAKE OF IRON AND VITAMINS
193 Diets: Lactating Women
All Areas and Villages, By Season

Nutrient	Fall	Winter	Spring	Summer	Average All Seasons	NRC Recommended Intakes[a]
Iron (mg.)	28.0	33.4	41.5	15.9	29.7	15
Vitamin A (I. U.)	4527	5421	4851	3029	4457	8000
Thiamine (mg.)	1.325	1.485	1.751	1.371	1.483	1.700
Riboflavin (mg.)	2.444	2.655	2.351	1.719	2.292	2.500
Niacin (mg.)	36.0	36.4	43.0	40.8	39.1	19.0
Ascorbic Acid (mg.)	41	20	19	55	34	150
Total Number Subjects	52	102	22	17	193	

of age were not receiving supplements of any kind. In general, daily supplementation of the infant's diet with cereals, vitamin

TABLE 37.—AVERAGE DAILY INTAKE OF PROTEIN
193 Diets: Lactating Women
By Geographical Area, All Seasons
(NRC Recommended Daily Level—98 gms.)

Protein Intakes	Geographical Area & No. of Records			
	N. Eskimo	SW. Eskimo	N. Central Athapascan	Totals
25 - <50 gms.	1	....	....	1
<75 gms.	3	4	1	8
<100 gms.	5	11	3	19
<150 gms.	9	47	6	62
150 gms. & over	23	74	6	103
Total Number of Records	41	136	16	193

TABLE 38.—AVERAGE DAILY INTAKE OF CALCIUM
193 Diets: Lactating Women
By Geographical Area, All Seasons

Calcium Intakes	Geographical Area & No. of Records			
	N. Eskimo	SW. Eskimo	N. Central Athapascan	Totals
<100 - <300 mg.	3	24	4	31
<400 - <500 mg.	13	55	5	73
<600 - <700 mg.	16	35	3	54
<800 - <900 mg.	7	13	1	21
<1000	....	1	1	2
<1100	2	1	....	3
<1200	....	4	....	4*
<1400	....	1	1	2
<1500	....	1	1	2
<2000	....	1	....	1**
Total Number of Records	41	136	16	193

* NRC LEVEL 1964
** NRC LEVEL 1958

TABLE 39.—AVERAGE DAILY INTAKE OF IRON
193 Diets: Lactating Women
By Geographical Area, All Seasons
(NRC Recommended Daily Level—15 mg.)

Iron Intakes	Geographical Area & No. of Records			
	N. Eskimo	SW. Eskimo	N. Central Athapascan	Totals
<10 mg.	1	32	1	34
<20 mg.	5	44	8	57
<30 mg.	10	23	3	36
30 & over	25	37	4	66
Total Number of Records	41	136	16	193

preparations, meat, fish, fruits and vegetables was not commonly practiced until infants were 9 to 12 months of age or older (Tables 48, 50, 53, 57).

From a nutritional standpoint, breast feeding without supplementation may be adequate for the first few months of life, provided the mother is healthy, has an adequate diet, and produces enough milk to satisfy the infant's needs. This is not the case for formula fed infants, for whole cow's milk—fresh, evaporated, dried or fortified—is low in iron and ascorbic acid; these nutrients must be added to the infant's diet at a fairly early age. A review of current supplementary food practices reveals that these supplements are not being provided in sufficient quantity or consistently enough to meet the needs of the majority of formula fed infants. Where supplementary foods are not available, suitable vitamin-iron preparations could be used to advantage (Tables 48, 50, 53).

Individual samples of cow's milk and human milk show wide variations in the essential nutrients.(27,28,29) However, average values based on many samples show that human milk is higher in iron and niacin and about four times as high in ascorbic acid as cow's milk. Cow's milk, on the other hand, is slightly higher in thiamine and considerably higher in riboflavin.

The Diet of Lactating Women: The effect of diet on the nutritive content of both human and cow's milk has been demonstrated. Kon and Mawson(30) found that the ascorbic acid content of human milk depends on the daily amounts of this nutrient taken

TABLE 40.—AVERAGE DAILY INTAKE OF VITAMIN A
193 Diets: Lactating Women
By Geographical Area, All Seasons
(NRC Recommended Daily Level—8000 I. U.)

Vitamin A Intakes	Geographical Area & No. of Records			
	N. Eskimo	SW. Eskimo	N. Central Athapascan	Totals
<1500 I. U.	1	18	....	19
<3000 I. U.	6	39	7	52
<4500 I. U.	10	33	4	47
<6000 I. U.	5	18	....	23
<7500 I. U.	5	11	1	17
<9000 I. U.	4	11	1	16
9000 & over	10	6	3	19
Total Number of Records	41	136	16	193

TABLE 41.—AVERAGE DAILY INTAKE OF ASCORBIC ACID
193 Diets: Lactating Women
By Geographical Area, All Seasons
(NRC Recommended Daily Level—150 mg.)

Ascorbic Acid Intakes	Geographical Area & No. of Records			
	N. Eskimo	S.W. Eskimo	N. Central Athapascan	Totals
<15 mg.	21	91	6	118
<30 mg.	7	8	3	18
<45 mg.	3	17	....	20
<60 mg.	4	6	1	11
<150 mg.	3	12	5	20
150 mg & over	3	2	1	6
Total Number of Records	41	136	16	193

in by lactating women. Thus seasonal increases in the ascorbic acid content of breast milk would be expected among Alaskan Eskimos and Indians in areas where edible greens and cloudberries are used generously when available. In our study we found the ascorbic acid intakes of lactating women were highest in summer (average of 55 mg.) and fall (average of 41 mg.) and lowest in winter and spring (averaging about 20 mg.) (Table 36).

Although there was a wide range in individual average daily intakes of ascorbic acid, about 60 percent of the diets of lactating women showed intakes below 15 mg. daily. These low intakes occurred in all geographic areas but were more prevalent in southwest Alaska. Average daily intakes of iron and vitamin A below the level recommended by the National Research Council were also more common in this area.

The protein intakes of most lactating women were well above the NRC recommended level. Very few, however, reached the recommended calcium levels. In about 90 percent of the records the average daily calcium intake was below the recommended level of one gram; about 50 percent showed average daily intakes under 500 mg.

Milk, the chief source of calcium, is not a regular part of the adult Eskimo and Indian diet except as it is used in place of cream in coffee. Often this is as little as 1 teaspoon and occasionally as much as two tablespoons per cup of coffee. Many do not use it. The only other major source of calcium is fish, particularly needlefish and blackfish which are eaten whole. They are available, mostly in the Kuskokwim-Yukon delta area, from late fall throughout the winter but even then only sporadically. (Tables 36–41).

Adequacy of the Infant Diet and Nutrient Source: A total of 282 diet records covering 3 to 7 days each for formula fed infants under 2 years of age were converted to mean daily nutrient intakes. Most of the diets for infants up to 11 months of age were adequate or better in respect to their content of protein, calcium, vitamin A and riboflavin. Protein and vitamin A intakes below the recommended allowances began to show up between the 12th and 23rd months of age. The percent of diets with calorie, iron, niacin and ascorbic acid intake levels below the recommended allowances remained high throughout the first two years of life (Table 42, 53, 62, 70, 72).

The nutrient content of the infant diet, like that of older children and adults, was extremely variable. Mean intakes of all the major nutrients varied from very low to very high; these extremes in intake occurred at all seasons. High intakes, especially of iron, vitamin A, niacin and ascorbic acid, depended on the seasonal availability of particular kinds of local food products. Mean ascorbic acid intakes, for example, tended to be highest in late summer and early fall, especially in tundra areas where cloudberries are available. Low nutrient intakes were more common from mid-winter through early spring when supplies of imported and stored local foods are generally exhausted and fresh supplies not yet available (Table 43).

TABLE 42.—PERCENTAGE OF DIETS WITH AVERAGE DAILY INTAKES BELOW THE RECOMMENDED ALLOWANCE: NINE NUTRIENTS(4)

282 Diets—Formula-Fed Infants—<2 Years
By Age Group, All Seasons

Nutrient	Percent Intakes Below NRC Recommended Allowance By Age Group			
	To 5 Mos.	6–11 Mos.	12–17 Mos.	18–22 Mos.
Calories	75.8	82.8	85.8	67.8
Protein			28.2	23.8
Calcium		10.0	39.3	51.1
Iron	100.0	90.0	73.7	48.8
Vitamin A			16.1	20.2
Thiamine	41.3	68.5	69.6	61.9
Riboflavin				7.1
Niacin	72.4	81.4	58.5	40.4
Ascorbic Acid	68.9	87.1	79.7	77.3
Total Number Diets	29	70	99	84

Repeated shortages of essential nutrients in the infant diet are bound to adversely affect the general health and well being as well as the growth pattern of the infant and young child, especially if they persist for any length of time (Tables 44 and 57).

The tremendous change in infant feeding customs that has taken place in the last quarter century emphasizes the critical need for a continuing program of nutrition education for Eskimo and Indian mothers. This is evident from our data which show that 50 percent or more of each of the eleven major nutrients in the formula-fed infants' diet now comes from imported foods. Of the ten major food groups contributing nutrients to these diets, cow's milk was the most important. It was the source of one-half or more of the calories, protein, fat, calcium and riboflavin and almost half of the vitamin A (Table 45).

Local foods contributed significantly to four major nutrients in these diets, namely, protein, iron, niacin and ascorbic acid. There were, however, seasonal variations in the importance of local foods as sources of these nutrients. For example, local foods rich in pro-vitamin A were more important in spring and early summer diets than at other times of the year. These nutrient sources were not equally available to all Eskimos and Indians (Tables 46 and 47).

TABLE 43.—NUTRIENT DISTRIBUTION AND INTAKE RANGES
282 Diets: Formula-Fed Infants <2 Years
All Areas and Villages, All Food Sources, By Season

Nutrients	Fall (58)*			Winter (150)*			Spring (39)*			Summer (35)*		
	High	Low	Ave.	High	Low	Ave.	High	Low	Ave.	High	Low	Ave.
Calories	1670	259	899	1909	370	869	1557	516	899	1290	405	851
Protein (gm)	128.2	13.2	49.9	131.5	16.2	42.3	91.0	26.4	48.3	113.5	17.6	44.9
Fat (gm)	97.6	14.4	43.2	89.4	17.4	42.4	70.6	23.6	44.1	66.9	19.2	40.9
Carbohydrates (gm)	148.0	18.6	77.3	191.3	27.9	80.4	210.3	37.2	77.5	127.7	35.0	76.3
Calcium (mg)	1717	282	956	2150	162	983	1813	196	1059	2025	270	944
Iron (mg)	46.7	0.6	5.2	36.1	0.6	5.1	11.6	0.8	4.6	25.1	0.6	4.7
Vitamin A (I.U.)	11185	756	3024	13219	351	3368	8123	1169	2543	3337	1005	1858
Thiamine (mg)	4.528	0.090	0.567	4.625	0.135	0.705	1.400	0.180	0.466	0.816	0.120	0.419
Riboflavin (mg)	6.283	0.678	1.733	6.149	0.539	1.822	2.879	0.905	1.893	3.021	0.899	1.589
Niacin (mg)	41.4	0.6	6.6	35.0	0.6	6.4	26.9	0.7	6.2	22.3	0.6	5.9
Ascorbic Acid (mg)	153	0	26	190	0	18	57	0	7	244	0	24

* Number of Records

TABLE 44.—PERCENTAGE OF NUTRIENT INTAKES BELOW NRC RECOMMENDED ALLOWANCES(4)
282 Diets: Formula-Fed Infants <2 Years
By Season

Season	Nutrient								
	Calories	Protein	Calcium	Iron	Vitamin A	Thiamine	Riboflavin	Niacin	Ascorbic Acid
Fall	82.8	28.1	46.9	76.6	31.3	75.0	4.7	67.2	70.3
Winter	85.8	29.0	42.6	78.4	30.2	70.4	11.7	67.3	81.5
Spring	82.2	13.3	31.1	73.3	28.9	84.4	11.1	73.3	93.3
Summer	97.1	31.4	45.7	85.7	54.3	91.4	....	82.9	82.9
Average	85.9	26.8	42.1	78.1	33.0	75.8	8.8	69.9	81.0

TABLE 45.—AVERAGE DAILY INTAKE OF NUTRIENTS FROM SELECTED FOOD GROUPS
282 Diets—Formula-Fed Infants <2 Years
All Areas and Villages, All Seasons, All Food Sources

Food Group	Nutrients										
	Calorie	Protein (gm)	Fat (gm)	Carbo-hydrate (gm)	Calcium (mg)	Iron (mg)	Vitamin A (I.U.)	Thiamine (mg)	Ribo-flavin (mg)	Niacin (mg)	Ascorbic Acid (mg)
Dairy	481	25.3	27.1	33.8	895	1.0	1288	0.149	1.293	0.9	1
Meat	36	6.1	1.1	0.8	3	1.5	170	0.029	1.106	1.1	....
Fish	57	9.4	2.0	0.2	10	0.3	199	0.031	0.088	1.6	....
Egg	4	0.3	0.3	....	1	0.1	24	0.001	0.005	....	....
Fats as such	20	....	2.3	....	....	....	78	....	....	....	....
Grains	209	4.5	8.3	29.2	67	1.6	21	0.156	0.102	1.2	....
Sugar	30	0.1	0.2	7.2	2	....	....	....	....	....	....
Fruits	30	0.2	1.1	5.1	4	0.1	115	0.011	0.009	0.1	9
Vegetables	6	0.2	0.1	0.9	2	0.1	115	0.004	0.005	0.1	1
Miscellaneous	4	0.2	0.1	0.6	1	0.2	687*	0.158*	0.151*	1.2*	7*
Average Daily Intake	877	46.3	42.6	77.8	985	4.9	2697	0.539	1.759	6.2	18

* Mostly multiple vitamin preparations

TABLE 46.—PERCENT NUTRIENT FROM FOOD SOURCE
282 Diets: Formula-Fed Infants <2 Years
All Areas and Villages, All Seasons

Nutrient	Food Source			
	Local	Imported	Mixed	Vitamins
Calories	11.2	86.0	2.8	....
Protein	31.1	65.0	3.9	....
Fat	8.5	88.2	3.2	0.1
Carbohydrate	1.8	96.6	1.6	....
Calcium	1.4	98.5	0.1	....
Iron	32.9	57.8	6.3	3.0
Vitamin A	17.3	63.4	2.4	16.9
Thiamine	13.4	66.2	3.2	17.2
Riboflavin	10.7	81.8	2.1	5.4
Niacin	45.1	38.1	5.1	11.7
Ascorbic Acid	33.7	25.7	10.6	30.0

Although certain local foods first appeared in the diets of very young infants, they were not commonly used until infants were 9 months of age or older. Fish, for example, was recorded on only 1 out of 26 diet records collected for infants up to 4 months of age, but it appeared as a supplement on slightly more than half of the diet records for infants 9 to 12 months of age.

Meat appeared in the diet of only one infant under 5 months of age; on about one-fourth of the diets for infants 9 to 10 months of age, increasing to over half of the diets for those 11 to 12 months of age (Table 48).

Blubber first appeared in the diet of a 5 month old infant; by the 12th month of age about one-fifth were receiving blubber. One month-old infant was given "baby agutuk" but this mixture of fats was apparently not a common infant dietary supplement, for only about one-third of the records for infants 12 months of age showed its use. According to informants, however, its use was more common at fall berry camps where it was mixed with the fresh berries, or in certain tundra villages where it was mixed with cooked fresh fish liver, and in the north where it was mixed with cooked fresh caribou meat (Table 49).

Wild edible greens and roots did not appear on the diets of infants under 11 months of age and even after this age very few infants received them as supplements (Table 50).

Detailed examples of the seasonal use of local (italics) and other foods in the diets of four infants at Hooper Bay are

TABLE 47.—PERCENT NUTRIENT FROM FOOD SOURCE
282 Diets: Formula-Fed Infants <2 Years
All Areas and Villages, By Season

Nutrient	Local Food				Imported Food				Mixed Food				Vitamins			
	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer
Calories	11.8	9.7	10.9	12.0	83.9	88.0	88.2	84.0	4.1	2.3	0.9	4.0	0.2	*	......	......
Protein	34.9	26.6	31.0	31.9	60.8	69.5	66.7	63.1	4.3*	3.9	2.3	5.0	......	......	......	......
Fat	8.7	9.3	8.2	8.2	85.8	88.2	91.5	86.9	5.1	2.5	0.3	4.9	0.4	......	......	......
Carbohydrate	1.6	0.7	0.7	4.1	95.8	98.2	98.7	93.8	2.6	1.1	0.6	2.1	......	......	......	......
Calcium	1.2	1.3	1.4	1.6	98.6	98.5	98.5	98.2	0.2	0.2	0.1	0.2	......	......	......	......
Iron	24.6	31.5	37.9	37.6	56.3	63.0	59.3	52.4	7.1	5.3	2.8	10.0	12.0	0.2	......	......
Vitamin A	14.1	12.0	20.7	22.5	58.1	54.9	68.7	71.9	3.5	1.4	0.4	4.2	24.3	31.7	10.2	1.4
Thiamine	14.7	7.1	14.9	16.8	62.9	50.8	74.0	77.1	4.2	1.6	1.5	5.3	18.2	40.5	9.6	0.8
Riboflavin	10.1	8.7	10.8	12.9	81.3	77.0	85.6	83.5	2.5	1.4	1.1	3.4	6.1	12.9	2.5	0.2
Niacin	44.0	32.5	48.6	55.4	37.6	37.0	40.7	37.2	6.3	3.7	3.5	6.8	12.1	26.8	7.2	0.6
Ascorbic Acid	25.5	17.0	20.7	71.8	35.7	13.1	40.7	13.4	18.5*	7.6	1.7	14.2	20.3	62.3	36.9	0.6

* Mostly from local food sources

TABLE 48.—PROTEIN SUPPLEMENTS USED IN INFANT DIETS

Breast and Formula-Fed Infants <2 Years*
All Areas and Villages, All Seasons, By Age

Protein Supplement	Age Level and Number of Records				
	3 Mos.	4-7 Mos.	8-12 Mos.	13-18 Mos.	19-23 Mos.
Eggs			17	18	16
Meat: Flesh		1	50**	85	79
Liver			1	6	1
Fish: Flesh		4	66***	85	80
Liver			10	9	3
Total Records	86	94	132	136	107

* 555 Diet Records of 3 to 7 days each.
** Mostly after 9 mos. of age.
*** Mostly after 8 mos. of age.

TABLE 49.—USE OF FAT SUPPLEMENTS IN INFANT DIETS

Breast and Formula-Fed Infants <2 Years*
All Areas and Villages, All Seasons, By Age

Fat Supplement	No. Records Showing Use at Different Age Levels				
	<3 Mos.	4-7 Mos.	8-12 Mos.	13-18 Mos.	19-23 Mos.
Butter/Oleo		1	13	35	47
Hydrogenated		1	6	6	7
Seal Mammal Blubber/Oil		3	18	23	28
Agutuk**	1		26	35	24
Other		1	12	18	26
Total Number of Records Analyzed	86	94	132	136	107

* 555 Diet Records of 3 to 7 days each.
** Used mostly in fall of the year and, except for <3 months, contained local berries also.

presented in Table 51. A more general seasonal appearance of local foods on 141 food intake records from this same village is shown in Tables 51 and 52.

TABLE 50.—USE OF FRUITS AND VEGETABLES IN INFANT DIETS

Breast and Formula-Fed Infants <2 Years*
All Areas and Villages, All Seasons, By Age

Fruit Supplement	No. Records Showing Use at Different Age Levels				
	<3 Mos.	4-7 Mos.	8-12 Mos.	13-18 Mos.	19-23 Mos.
Fruit					
Infant, canned**	4	5	14	7	2
Other, canned			13	32	23
Juice, canned**	1	9	14	11	9
Dry, cooked/raw			12	22	17
Fresh (apples, oranges)			3	5	6
Local berries, raw***			16	25	27
Agutuk***			26	35	24
Vegetables					
Infant, canned**	1	4	8	8	
Other, canned		1	7	16	13
Local greens			2	2	4
Local root vegetables			2	3	2
Total Number of Records Analyzed	86	94	132	136	107

* 555 Diet Records of 3 to 7 days each.

** Used mostly in Northern Alaska by both the Eskimo and Athapascan Indian.

*** Used mostly in fall of the year.

Vitamin supplementation of the infants' diet was not a common practice. Less than 10 percent of the 555 infant food intake records showed daily use of a vitamin preparation at the time the records were collected. Vitamin preparations were used more frequently during the winter season than at other times and also more frequently in northern than in southwestern villages. Their use was more evident immediately following a visit to the village by a public health nurse (Tables 53 and 54).

Calories: The National Research Council recommends that the caloric allowances for infants under one year of age be estimated on an individual basis as follows: 120 calories per kilogram body weight for infants 1 to 6 months of age, and 100 calories per kilogram for infants 7 to 12 months of age. To facilitate machine calculation, total caloric allowance for the 0 to 5 month age level was estimated at 800 calories and that for the 6 to 11 month age

TABLE 51.—USE OF SUPPLEMENTAL FOODS * ON INFANT DIETS (4 INFANTS—HOOPER BAY)

Record Month	Food Pattern by Monthly Age			
	Infant #1	Infant #2	Infant #3	Infant #4
January	(5 mo) Formula, *poke-fish*.	(6 mo) Formula, occasionally cod liver oil.	(12 mo) Breast-formula, fried bread, *agutuk*.	(14 mo) Formula, multiple vitamin supplements.
March	(7 mo) Formula, macaroni.	(8 mo) Formula, cereal, spaghetti.	(14 mo) Formula, bread	(16 mo) Formula, bread.
April	(8 mo) Formula, bread, cereal.	(9 mo) No Record.	(15 mo) No Record.	(17 mo) Formula, bread with lard, *seal meat*, *duck meat*.
May	(9 mo) Formula, cereal, *duck eggs*.	(10 mo) Formula, *fish*—cooked and raw.	(16 mo) Formula, bread, soup, *duck eggs*.	(18 mo) Formula, bread, *duck eggs*, cooked *fish*, *goose* meat.
June	(10 mo) Formula, cereal, *duck eggs*, cooked *fish*.	(11 mo) Formula, bread, cereal, *fish* cooked.	(17 mo) Formula, bread, cereal.	(19 mo) No Record.
July	(11 mo) No Record.	(12 mo) Formula, cereal, pilot bread, *duck meat*, canned fruit, canned pork & beans.	(18 mo) Formula, bread, *salmonberries*, *agutuk*.	(21 mo) No Record.
August	(12 mo) Formula, bread, dry *fish*, *salmonberry agutuk*, *salmonberries*.	(13 mo) Formula, bread, cereal, *salmonberry agutuk*, *salmonberries*.	(19 mo) Formula, bread, *salmonberry agutuk*, *salmonberries*.	(20 mo) No Record.
September	(13 mo) Formula, bread,	(14 mo) Formula, bread, ce-	(20 mo) No Record	(22 mo) Formula, bread, *tom*

	cereal. candy, *tom cod livers, agutuk, salmonberries, cooked fish.*	real, *agutuk, tom cod livers, salmonberries, duck meat*		*cod livers, fish*—(poke, dry and cooked), *seal meat.*
October.....	(14 mo) No Record.	(15 mo) Formula, bread with margerine, cooked dry beans.	(21 mo) Formula, bread, cereal, *berry agutuk*	(23 mo) No Record.

* Local foods in italic.

TABLE 52.—SEASONAL SUPPLEMENTATION OF INFANT DIETS WITH LOCAL FOODS
Hooper Bay
(141 Food Intake Records for 35 Infants 6–23 Months of Age)

Local Foods	Times Appeared on Diets, By Season				
	Spring	Summer	Autumn	Winter	
	(May–June)	(July–August)	(Sept–Oct)	(Nov–Jan)	(Feb–April)
Berries, fresh or as agutuk	....	14	26	16*	4*
Eggs, wildfowl	12	....	....	....	....
Fish:					
Cooked	15	3	14	9	9
Dry*	3	7	8	3	....
Poke*	....	....	5	16	4
Liver (mostly tom cod)	1	....	7	1	1
Meat:					
Duck, Goose	5	9	6	1*	1*
Seal	2	1	4	5	11
Beluga	....	....	1	....	....
Seal Liver	....	....	....	....	2
No. Records	29	22	27	29	34

* Stored Product.

TABLE 53.—VITAMIN SUPPLEMENTATION
Breast and Formula-Fed Infants <2 Years*
All Seasons, By Age, By Area

Area	Age Level and Number of Records				
	3 Mos.	4-7 Mos.	8-12 Mos.	13-18 Mos.	19-24 Mos.
Northern Eskimo					
4 Villages Daily	8	12	2	2	4
Occas.	2	3	3	6	2
Southwestern Eskimo					
5 Villages Daily	3	5	4	6	....
Occas.	....	2	1	....	1
Athapascan Indian					
2 Villages Daily	7	4	5	7	3
Occas.	....	....	....	....	1
Total No. Records	86	94	132	136	107

* 556 Diet Records of 3 to 7 days each.

group at 940 calories daily, regardless of body weight. Caloric intakes are presented in Table 55.

While more than three-fourths of the diets for infants up to 5 months of age showed intakes of less than 800 calories daily, these may not be deficiencies. The lower intake may well have been for the younger infants in this grouping. The medium birth weight of 975 Alaskan Eskimo babies born in the Bethel USPHS Hospital was 7 to 7½ pounds(31). The caloric requirement at this weight would be approximately 370 calories and would gradually increase under normal conditions of growth and development.

TABLE 54.—PERCENT OF TOTAL VITAMIN INTAKE FROM PHARMACEUTICAL SUPPLEMENTS
282 Diets: Formula-Fed Infants <2 Years
By Season

Vitamin	Fall	Winter	Spring	Summer
Vitamin A	24.3	31.7	10.2	1.4
Thiamine	18.2	40.5	9.6	0.8
Riboflavin	6.1	12.9	2.5	0.2
Niacin	12.1	26.8	7.2	0.6
Ascorbic Acid	20.3	62.3	36.9	0.6

Approximately 50 percent of the diet records for infants 6–11 months of age showed intakes of less than 700 calories daily, and approximately 40 percent of the diets for infants 12 to 23 months of age showed average daily intakes under 900 calories, some as low as 600 to 700 calories daily.

Approximately 43 percent of the calories in infant diets were obtained from fats, 35 percent from carbohydrates and 22 percent from protein.

Imported foods, chiefly dairy and grain products, accounted for most of the calories in infant diets, while local foods—meat, fish and fruits—were of minor importance. Only minor seasonal variations were noted in the use of imported versus local food sources, and mixed foods, mostly tingugtluk and similar mixtures, were least important in infant diets in spring (Table 56).

Sugar, syrup and cereal were the first supplemental foods added to infant diets. Sugar or Karo syrup first appeared as a formula additive at two months of age. By three months they appeared on 12 percent of the records, decreasing to 8 percent at the

TABLE 55.—CALORIC INTAKES
282 Diets: Formula-Fed Infants <2 Years
All Seasons, By Age Level

Average Daily Calorie Intake	Number in Each Age Group				Total No. Records
	0–5 Mos.	6–11 Mos.	12–17 Mos.	18–23 Mos.	
300	2	....	....	....	2
400	1	1	1	....	3
500	5	6	....	....	11
600	8	13	4	3	28
700	6	17	11	6	40
800	3	14	18	11	46
900	2	7	15	10	34
1000	1	9	19	9	38
1100	1	....	11	13	25
1200	....	2	6	5	13
1300	....	1	9	10	20
1400	....	....	4	6	10
1500 & over	....	....	1	11	12
Total No. Records	29	70	99	84	282

(Heavy line indicates the maximum NRC recommended allowance (4).)

4 to 7 month age level and then increasing to 21 percent at 19 to 23 months of age (Table 57).

Sugar was used only occasionally on cereals before infants were 7 months of age, but by 19 to 23 months of age about 60 percent of the diets included sugared cereal. Syrup was used infrequently on hotcakes before infants were 13 months old but from then on its use increased. Candy appeared on the diet record of one four month old infant, but in general, it was rarely reported until infants were a year old. Our records did not cover the periods of the "candy binges" which occur after the arrival of the supply boat, at Christmas time and other holidays.

Of the three common cereals used on infant diets oatmeal was the most popular. Cost limited the use of specially prepared infant cereals. In general, cereals were used infrequently until infants were 5 to 7 months of age. Breads, crackers and hotcakes, common items in the family dietary, were important supplemental foods from about 8 months of age on. Cakes, cookies and similar sweet breads were seldom used until infants were 13 to 18 months of age. Sweet breads are luxury items in most villages, and are usually available only briefly after the arrival of the annual supply ship or during holidays (Table 57).

Fat as such was an unimportant source of calories in the young infants' diet. Whether used by itself or as an ingredient

TABLE 56.—SOURCE OF CALORIES
282 Diets: Formula-Fed Infants <2 Years
By Season

Food Source	Season			
	Fall	Winter	Spring	Summer
Local	105	85	98	102
Imported	746	765	793	715
Mixed	36	20	8	34
Pharmaceuticals	2			
Average Daily Caloric Intake	889	870	899	851

TABLE 57.—CARBOHYDRATE SUPPLEMENTS
Breast and Formula-Fed Infants <2 Years*
By Age, All Areas and Villages, All Seasons

Food Group	Age Level and Number Records				
	3 Mos.	4–7 Mos.	8–12 Mos.	13–18 Mos.	19–23 Mos.
Cereals					
Infant cereals	4	13	14	8	2
Oats	5	18	53	81	50
Rice		5	27	34	28
Breads					
Pilot, Yeast, Sourdo	1	14	63	103	97
Hotcakes		3	34	68	53
Cakes, Cookies		1	14	24	27
Soups with					
Rice and Macaroni	2	16	51	66	59
Sugars & Syrups					
In Formula	11	12	16	12	23
On bread, cereal	2	9	48	74	66
On hotcakes			1	16	13
Candy	0	2	5	24	19
Total Records	86	94	132	136	107

* 555 Diet Records of 3 to 7 days each.

of agutuk, it was only occasionally fed to babies under 9 to 10 months of age, but from then on it was used more frequently (Table 49).

Protein: Most infants eleven months of age and under met their protein requirements adequately but after 12 months of age about one-fourth of the records showed average daily intake values below the NRC recommended allowances. Imported foods, chiefly milk, were the principal source (Tables 58, 59).

Eggs did not contribute materially to the protein intake of infants as they were not generally available. Hooper Bay, Newtok, Point Hope and Shishmaref were the only study villages where significant quantities of wildfowl eggs were gathered and used. They were available only in late May and early June in southwestern Alaska, and in June and early July in the northern villages. But even in these villages they did not appear on the diets of infants under 7 months of age and from then on only rarely. According to Eskimo informants wildfowl eggs are not used as much as they were in former times. Hen's eggs were seldom available in the villages except for the Indian village of Huslia and even there they were not commonly used for infant feeding. Imported eggs were very costly and none of the villages had suitable storage facilities (Table 48).

TABLE 58.—PROTEIN INTAKES
282 Diets: Formula-Fed Infants <2 Years
By Age Level, All Seasons

Average Daily Intake Levels	Age Level				
	0–5 Mos.	6–11 Mos.	12–17 Mos.	18–23 Mos.	Totals
15 gms.	2	....	....	....	2
20 gms.	2	1	1	1	5
25 gms.	4	5	2	1	12
30 gms.	8	14	12	7	41
35 gms.	5	14	13	11	43
40 gms.	4	20	18	4	46
45 gms.	3	5	11	8	27
50 gms.	....	4	14	7	25
55 and over	1	7	28	45	81
Totals	29	70	99	84	282

(Dark line is NRC recommended level (4))

Meat, sometimes added as early as 5 months of age, did not appear on a significant number of diets until infants were 8 to 12 months of age. From then on its use gradually increased so that by 19 to 23 months of age it appeared on most of the diets. Animal livers appeared on only 8 of the 555 infant diet records, and these few records were for children over one year of age. Fresh livers were available only sporadically throughout the year.

Fish was introduced as early as four months of age, but appeared infrequently on diets until the infants were about 8 to 12 months of age. Fish livers appeared on only 22 of the 555 records collected, and none of these was for an infant under 8 months of age. Tingugtluk, a mixture containing fish livers, did not appear on diets until the infants were 9 to 10 months of age (Table 48).

Calcium: Calcium intakes were spread over an extremely wide range at all four age levels. Most diets for infants 11 months of age and younger met or exceeded the NRC recommended allowances, and the few that did not were close to it. Thirty-nine percent of the diets at the 12–17 month age level and 51 percent at the 18–23 month age level did not meet NRC recommendations. Many of these low intakes were borderline but a significant number of the diets showed quite low intakes. There was a significant number of high calcium intakes at all age levels (Tables 47, 60).

In general, low calcium intakes resulted when insufficient amounts of milk were included in the daily diet, especially after one year of age. High calcium intakes were generally the result of prolonged bottle feedings with insufficient use of supplemental

TABLE 59.—SOURCE OF PROTEIN
282 Diets: Formula-Fed Infants <2 Years
By Season
In Grams

Food Source	Season			
	Fall	Winter	Spring	Summer
Local	17.4	11.3	15.0	14.3
Imported	30.3	29.4	32.2	28.3
Mixed	2.1	1.6	1.1	2.3
Average Daily Intake	49.8	42.3	48.3	44.9

foods. Although both situations occur regardless of season, high intakes are more likely to occur in late winter and spring. At this time of the year both imported and local food supplies are usually low, especially in southwestern Alaska, and milk supplemented by

TABLE 60.—CALCIUM INTAKES
282 Diets: Formula-Fed Infants <2 Years
All Seasons, By Age Level

Average Daily Intake Levels	Number at Each Age Level				
	0–5 Mos.	6–11 Mos.	12–17 Mos.	18–23 Mos.	Totals
200 mg.				2	2
300 mg.				6	6
400 mg.			1	5	6
500 mg.	2		1	1	4
600 mg.		1	5	11	17
700 mg.	2	6	4	6	18
800 mg.	4	4	9	9	26
900 mg.		10	19	3	32
1000 mg.	6	12	10	5	33
1100 mg.	5	6	15	8	34
1200 mg.	2	8	12	12	34
Over 1200 mg.	8	23	23	16	70
Total Each Age Category	29	70	99	84	282

(Dark line—NRC recommended level.(4))

TABLE 61.—SOURCE OF CALCIUM
282 Diets: Formula-Fed Infants <2 Years
By Season
In Milligrams

Food Source	Season			
	Fall	Winter	Spring	Summer
Local	11.5	12.8	14.8	15.1
Imported	942.6	968.2	1043.1	927.0
Mixed	1.9	2.0	1.1	1.9
Average Daily Intake	956	983	1059	944

bread or crackers may be the only foods available to the family in sufficient quantity for infant feeding.

Milk provided 91 percent of the calcium in infant diets. Sources other than milk were: grain products, principally pablum, and similar cereals especially designed for infant feeding; Pilot

TABLE 62.—IRON INTAKES
282 Diets: Formula-Fed Infants <2 Years
All Seasons, By Age Level

Average Daily Intake	Age Level				
	0–5 Mos.	6–11 Mos.	12–17 Mos.	18–23 Mos.	Totals
1 mg	10	7	2	....	19
2 mg	15	28	9	5	57
3 mg	....	14	15	12	41
4 mg	4	9	21	8	42
5 mg	....	4	17	11	32
6 mg	....	1	9	5	15
7 mg	....	3	9	6	18
8 mg	....	2	3	8	13
over 8 mg	....	2	14	29	45
Total No. Records	29	70	99	84	282

(Heavy Line indicates the NRC recommended level.(4))

TABLE 63.—SOURCE OF IRON
282 Diets: Formula-Fed Infants <2 Years
By Season
In Milligrams

Food Source	Season			
	Fall	Winter	Spring	Summer
Local	1.3	1.6	1.7	1.8
Imported	2.9	3.2	2.7	2.5
Mixed	0.4	0.3	0.1	0.5
Vitamins	0.6	0.01*	....	....
Average Daily Intake	5.2	5.1	4.5	4.8

* Negligible

Bread; Jersey Creams; and sourdough bread when made with baking powder containing calcium. These foods, important only in the diet of infants over 7 months of age, furnished 7 percent of the total calcium intake. The two fishes most likely to furnish significant amounts of calcium in Eskimo diets were needlefish and blackfish which are eaten whole. Their use is confined to the southwestern villages and they did not appear in infant diets until the twelfth month (Table 61).

Iron: Average daily iron intakes were generally low by NRC standards throughout infancy. Not a single one of the diet records for infants under 5 months of age met the recommended daily allowance of 5 mg. In fact, almost 90 percent showed an average intake of only 1 to 2 mg. of iron daily. Average daily intakes as low as 1 to 3 mg. were found in 70 percent of the diets for infants 6 to 11 months of age and in almost a fourth of those 12 to 23 months of age (Table 62).

The major sources of iron in the diets of infants under 24 months of age were grain products, meat and milk; these furnished 32, 30 and 20 percent of the total, respectively. Vitamin and mineral preparations, eggs, fish, fruits and vegetables contributed only negligible amounts. Cereals such as pabium and oatmeal were used infrequently until infants were 11 to 12 months of age or older. Animal and fish livers obtained locally, and infant canned

TABLE 64.—VITAMIN A INTAKES
282 Diets: Formula-Fed Infants <2 Years
By Age Level, All Seasons

Average Daily Intake Levels	Age Level				
	0–5 Mos.	6–11 Mos.	12–17 Mos.	18–23 Mos.	Totals
500 I. U.	...	...	...	1	1
1000 I. U.	2	...	1	4	7
1500 I. U.	6	11	15	12	44
2000 I. U.	3	22	26	11	62
2500 I. U.	5	16	13	25	59
3000 I. U.	1	3	12	10	26
3500 I. U.	...	1	7	3	11
4000 I. U. & Over	12	17	25	18	72
Total No. Records	29	70	99	84	282

vegetable—meat preparations were only occasionally used throughout the infant-toddler period (Tables 48, 63).

Over half of the iron in these diets was from imported foods, chiefly grain products and milk. Approximately one-third came from local sources, including that from mixed foods made from local food products such as—fish livers, meat, berries and greens. Vitamin preparations containing iron were a significant source in the fall but in only two of the study villages. Their use was fortuitous and temporary (Table 63).

Vitamin A: The average daily intake of vitamin A of nearly all infants under 12 months of age met or exceeded the NRC recommended allowance; the majority of the deficiencies which appeared on records for infants 12–23 months of age were borderline. The average daily intake of vitamin A was lowest in summer.

More than half of the vitamin A in these diets came from imported foods chiefly milk and about one-fourth of it from vitamin supplements. The latter were a significant source on fall and winter diets only (Table 64, 65).

Meat and fish, including seal and fish livers, were unimportant sources of vitamin A until infants were 9 to 11 months of age. Fats, such as butter, margarine, seal oil, seal blubber, and agutuk containing seal oil, all of which contain varying amounts of vitamin A, were not important in the diet until infants were 11 to 12 months of age (Tables 48 and 49).

Seal and other sea mammal oils properly stored so as to retain their vitamin content, and fed so as to avoid aspiration of oil particles into the lungs, could be used more frequently than they

TABLE 65.—SOURCE OF VITAMIN A
282 Diets: Formula-Fed Infants <2 Years
By Season
In International Units

Food Source	Season			
	Fall	Winter	Spring	Summer
Local	426	404	526	418
Imported	1757	1849	1747	1336
Mixed	106	47	10	78
Vitamins	735	1068	259	25
Average Daily Intake	3024	3368	2542	1857

are, especially for older infants. Tests at the Arctic Health Research Center show that the oil from the beluga contains 2310 I. U. of Vitamin A per 100 grams; from ugruk (bearded seal) 5020 I. U.; from walrus 2600 I. U.; and that from the baleen whale, 2810 I. U. Carter et al(32) found that the blubber oil from hair seals also contained 20–100 I.U. Vitamin D per gram.

Thiamine: Average daily intakes of thiamine below the NRC recommended allowances occurred in significant numbers at all age levels (Table 66).

The chief sources of thiamine in the infant dietary were dairy products, grains and vitamin supplements. Although milk is not a rich source of this nutrient, it was important because of its daily use. Vitamin supplementation was not a common practice although it was used to some extent in fall and winter. The feeding of grain products, whether as cereals, breads or crackers, did not become a daily practice until infants approached the 8 to 10 month age level (Tables 45, 53, 57, 67).

Meat and fish products contributed very little to the total thiamine intake as they were seldom used before infants reached 8 to 9 months of age (Table 48).

TABLE 66.—THIAMINE INTAKES
282 Diets: Formula-Fed Infants <2 Years
By Age, All Seasons

Average Daily Intake Levels	Age Categories				
	0-5 Mos.	6-11 Mos.	12-17 Mos.	18-23 Mos.	Totals
.200 mg.	12	13	2	1	28
.400 mg.	6	35	39	23	103
.600 mg.	2	11	28	28	69
.800 mg.	1	3	15	17	36
1.000 mg.	....	1	5	4	10
1.200 mg.	2	1	1	4	8
1.400 mg.	3	4	1	....	8
1.600 mg. & Over	3	2	8	7	20
Total No. of Records	29	70	99	84	282

(Heavy line indicates NRC recommended level.(4))

TABLE 67.—SOURCE OF THIAMINE
282 Diets: Formula-Fed Infants <2 Years
By Season
In Milligrams

Food Source	Season			
	Fall	Winter	Spring	Summer
Local	.083	.050	.069	.052
Imported	.357	.358	.345	.323
Mixed	.024	.011	.007	.040
Vitamins	.103	.286	.045	.003
Average Daily Intake	.567	.705	.466	.418

Riboflavin: Average daily intakes of riboflavin generally equalled or exceeded NRC recommendations until infants were 18 to 23 months of age, and even then only a small number showed deficiency (Table 68).

Almost three-fourths of the riboflavin came from dairy products. Meat, grain products, fish and vitamin preparations were minor sources until infants were 8 to 9 months of age and older (Tables 45 and 69).

TABLE 68.—RIBOFLAVIN INTAKES
282 Diets: Formula-Fed Infants <2 Years
By Age, All Seasons

Average Daily Intake Levels	Age Categories				
	0–5 Mos.	6–11 Mos.	12–17 Mos.	18–23 Mos.	Totals
.500 mg					
.750 mg	2			6	8
1.000 mg	2	2	4	10	18
1.250 mg	4	6	11	9	30
1.500 mg	5	19	17	6	47
1.750 mg	3	12	22	15	52
2.000 mg. & over	13	31	45	38	127
Total No. of Records	29	70	99	84	282

(Dark line represents NRC recommendation.(4))

TABLE 69.—SOURCE OF RIBOFLAVIN
282 Diets: Formula-Fed Infants <2 Years
By Season
In Milligrams

Food Source	Season			
	Fall	Winter	Spring	Summer
Local	.175	.158	.204	.205
Imported	1.409	1.403	1.622	1.327
Mixed	.043	.027	.020	.054
Vitamins	.106	.234	.047	.003
Average Daily Intake	1.733	1.822	1.893	1.589

TABLE 70.—NIACIN INTAKES
282 Diets: Formula-Fed Infants <2 Years
By Age, All Seasons

Average Daily Intake Levels	Age Categories				
	0–5 Mos.	6–11 Mos.	12–17 Mos.	18–23 Mos.	Totals
2 mg.	20	39	8	5	72
4 mg.	1	12	31	13	57
6 mg.	1	6	20	16	43
8 mg.	1	3	15	14	33
10 mg.	....	3	7	9	19
12 mg. & over	6	7	18	27	58
Total No. Records	29	70	99	84	282

(Dark line indicates NRC recommended level.(4))

Niacin: Macy et al(29) state that it is difficult for either breast or artificially fed infants to meet the NRC recommended daily allowance for niacin. This appeared to be true for formula-fed Alaskan infants, for more than half of the diets for infants up to 11 months of age showed daily intakes of 2 mg. or less. Less than one-fourth had intakes equal to or above the NRC recommended allowances.

Intakes were based on the content of niacin as such in foods. However, protein foods such as milk, eggs, meat and fish are all rich in tryptophane, which can be converted in the body to niacin. Infants receiving adequate amounts of milk supplemented by other protein foods should have no difficulty in meeting the niacin requirement. Yet, a significant number of infants, particularly between 12 and 23 months of age, did not receive either adequate amounts of milk nor adequate protein supplementation (Table 45, 48, 70).

Local meat and fish sources, including that used in mixed food preparations, contributed about one-half of the niacin in these diets in all seasons except winter. Vitamins were an important source during winter but only in the northern Athapascan village of Allakaket where they were dispensed and their use encouraged by a resident missionary nurse (Tables 53 and 71).

TABLE 71.—SOURCE OF NIACIN
282 Diets: Formula-Fed Infants <2 Years
By Season
In Milligrams

Food Source	Season			
	Fall	Winter	Spring	Summer
Local	2.9	2.1	3.0	3.3
Imported	2.5	2.4	2.5	2.2
Mixed	0.4	0.2	0.2	0.4
Vitamins	0.8	1.7	0.4	<0.1
Average Daily Intake	6.6	6.4	6.1	5.9

Ascorbic Acid: A high proportion of infant diets showed ascorbic acid intakes below NRC recommended allowances. One-third of the diets appeared to be devoid of ascorbic acid, while an additional one-fourth of them showed average intake values of only 1 to 5 mg. In spite of these seemingly low intakes, to the knowledge of the investigator, none of the infants showed overt signs of scurvy (Table 72).

Foods that would have provided at least minimal intakes of ascorbic acid, such as local meats, fishes, berries, and greens, were seldom included in the diets for infants under 10 months of age. These foods appeared only sporadically or seasonally in the diets of older infants (Tables 48 and 50).

The broth from cooked meat and fish, usually with rice and/or macaroni added, was commonly fed to infants from about 8 months of age; it occasionally appeared on the diets of infants three months of age. When made with fresh meat this broth or soup probably contains some ascorbic acid due to the leaching of the vitamin into the cooking water.

Although fruit and fruit juices appeared on the diets of infants as young as one month of age, they were used very infrequently until 7 months of age. These were usually canned fruits and fruit juices specially prepared for infants although occasionally the heavy syrup from ordinary canned fruit products was used. The use of prepared infant food preparations was limited by cost (Table 50).

Local wild berries did not appear in the diet before the infants were 7 months of age. It should be noted, however, that diet records were not collected at the scattered summer and fall berry camps when the fresh berries were available. Mixtures containing berries—agutuk and tingugtluk—were more likely to appear on infant diets in the southwestern Eskimo villages. Among the local berries, the cloudberry has the highest ascorbic acid content, containing more than 178 mg. per 100 grams when fresh and 158 mg. and more when properly stored (33) (Tables 49 and 50).

Ascorbic acid from vitamin preparations was highest at the Indian village of Allakaket thanks to the encouragement of the missionary nurse.

TABLE 72.—ASCORBIC ACID INTAKES
282 Diets: Formula-Fed Infants <2 Years
By Age, All Seasons

Average Daily Intake Levels	Age Categories				
	0–5 Mos.	6–11 Mos.	12–17 Mos.	18–23 Mos.	Totals
0 mg.	14	34	27	18	93
1-5 mg.	3	17	28	26	74
Up to 10 mg.	1	7	9	7	24
Up to 15 mg.	1	3	3	6	13
Up to 20 mg.	....	....	4	4	8
Up to 25 mg.	1	....	5	2	8
Up to 30 mg.	1	....	3	2	6
Up to 35 mg.	1	....	....	....	1
Over 35 mg.	7	9	20	19	55
Total No. Records	29	70	99	84	282

(Dark line indicates NRC recommended level.(4))

Vegetables did not contribute materially to the total intake of any of the 11 nutrients studied. They appeared much less frequently in infant diets than did fruits. Vegetables were not commonly used in adult diets either, except seasonally in those Eskimo villages located where wild edible greens are available in quantity. Residents of Shishmaref and Hooper Bay gather significant quantities of these greens. The people of Hooper Bay, Noatak, and Shungnak gather considerable quantities of edible roots and other underground plant parts but they are not generally given to infants (Table 50).

TABLE 73.—SOURCE OF ASCORBIC ACID
282 Diets: Formula-Fed Infants <2 Years
By Area, All Seasons
In Milligrams

Food Source	Geographic Area		
	Southwestern Eskimo	Northern Eskimo	N. Central Athapascan
Local	4.4	2.4	1.2
Mixed	2.2*	0.3	0.2
Imported	3.4	5.6	13.2
Vitamin Preparations	5.8	7.2	16.9
Average Daily Intake	15.8	15.5	31.5

* Mostly from local foods.

TABLE 74.—SOURCE OF ASCORBIC ACID
282 Diets: Formula-Fed Infants <2 Years
By Season
In Milligrams

Food Source	Season			
	Fall	Winter	Spring	Summer
Local	7	3	1	17
Imported	9	2	3	3
Mixed*	5	<1	1	3
Vitamins	5	11	3	1
Average Daily Intake	26	16	8	24

* Mostly from Local Foods.

Of all the nutrients, the intake of ascorbic acid showed the greatest seasonal variation. Local food products provided the highest percentage in summer, chiefly through the increased use of berries, particularly cloudberries which are gathered in July and August, especially at Hooper Bay and Kasigluk (Table 74).

Intakes of ascorbic acid in summer and fall often approached the NRC recommended allowance in some villages because of the use of local berries and greens. Intakes were lowest in May and early June, when both stored food supplies and cash are generally low and hunting activities often curtailed. The few families who still went to traditional spring camps seemed to fare the best, for these camp sites were usually located where fresh fish, wildfowl, wildfowl eggs and sometimes wild edible greens were obtainable (Table 74).

In the overall yearly diet, local food sources and vitamin preparations accounted for about one-third each and imported foods about one-fourth of the total ascorbic acid intake (Table 74).

FOOD USE AND PREPARATION

INTRODUCTION

The first concern of a people dependent on their immediate environment for subsistence is to obtain enough food to satisfy hunger. Whether or not a man and his family succeed in this undertaking depends on what is available seasonally throughout the year; on family skills in hunting, fishing and food gathering; on the ability to anticipate needs and to devise successful ways of preserving and storing sufficient foods for off-season use.

Food also fulfills other satisfactions and needs, among which are the promotion of health through proper nutrition, the means for sociability and simple gustatory delight. Considering the very limited number of foods that were and are available to any one geographic group of Eskimos in a given year, they have succeeded admirably in using them in many imaginative and satisfying nutritional ways.

Food preparation in Indian and Eskimo homes is traditionally done by the women. "In times past," Petroff(15) states, "the men, while in the villages, normally spent a great deal of their time in the Kashims (men's community building), and while living there would occasionally cook their own breakfasts, but usually the wives would bring them their food already prepared." Today men cook when living alone, when their wives are away or when on hunting expeditions.

TYPES OF COOKING STOVES AND FUEL

Even in the most primitive of present day Eskimo homes the seal oil lamps have long since been replaced by wood or oil-burning stoves. In areas like Point Hope, where seal blubber is often plentiful and wood scarce, the blubber may still be used to obtain a quick, hot fire.

Most stoves found in Eskimo and Indian homes are locally made, usually from discarded oil barrels. Occasionally one finds a typical modern oil range bought when the head of the family was temporarily employed on a well-paying job. Most of these stoves have been abandoned or stored, and the family has returned to the use of the small, home-made variety that uses a minimum of fuel. In the larger, more sophisticated villages, such as Kotzebue and Bethel, where many of the families have a year-round steady income, modern oil stoves are more commonly used.

The gasoline camp stove is the most popular stove on extended hunting, fishing and camping trips and while traveling. In many homes it is occasionally used for emergency cooking and further use is limited only by the high cost of the gasoline.

At many of the north central Alaskan villages where the summers are usually fairly dry and warm (rainfall averages 8 inches a year and temperatures may be in the 80's and 90's) families that remain in the village often dismantle their household stove and reassemble it just outside their cabins. Here they do their cooking and heating of water for laundry purposes. This type of stove is easily transported to hunting camps out on the ice, as at Point Hope during the whaling season, and to other family hunting and fishing camps. It serves a double purpose—for cooking and to keep the living quarters (tents) dry and comfortable.

Many villages are not favorably located for the acquisition of fuel. Driftwood is commonly used for fuel in coastal villages, but its availability varies considerably from village to village and often from year to year. At one time Hooper Bay residents thought seriously of moving their village site because driftwood was so scarce, but then a single storm tossed several years' supply upon the beach.

The tundra villages, especially those scattered throughout the Yukon-Kuskokwim delta region, have the most difficulty in obtaining fuel. The sparse copses of willow in the immediate village area have been depleted, and the people now have to go farther and farther away in search of similar willow copses and river driftwood. Hence, it is not unusual in these villages to find that even in the dead of winter, stoves are used only during meal preparation. Villages located in tree-bearing areas, of course, have no such problem.

MEALS, GENERAL COOKING AND STORAGE PROCEDURES

Early observers of arctic Eskimo life report that boiling was the most common method of cooking(34,35,36). Cooking in water, which may not be actually boiling, is still the favorite method of cooking meats and fishes. The thoroughness of the cooking depends on individual tastes, the amount of fuel available, or the amount of time the women can spare from other duties. When the women are engaged in fishing and hunting small game in the local area, berry picking, gathering greens or bird eggs, preparing the fish and meat catch for drying and storage, or tanning hides, cooking as well as other household duties, of necessity, receive only minimum time and attention. Meat or fish, put in a pot of cold water and placed over the fire, may be cooked such a short time as to be barely heated through.

Gilder(37), 1878, in writing of his arctic experiences among the Canadian Eskimos, states that "warm food was especially welcomed as a treat in extreme weather, or as a celebration after a successful hunt."

Stefansson(34) reports that a meal served him consisted of two courses—boiled seal meat, on the underdone side, and a soup "made by pouring seal blood into the broth immediately after the cooked meat has been taken out of the pot and stirring briskly until the whole comes nearly, but never quite to the boil—."

Cooked fish or meat is often cut up and served individually, or it may be placed on a wooden tray or other serving dish, and each person cuts off the amount desired, either as a single large piece, or in some instances, as bite-size pieces. This latter method is practiced on St. Lawrence Island. The soup or broth is then served separately.

Thickening the cooking broth with seal or caribou blood, as outlined by Stefansson, is not generally practiced today among the Alaskan Eskimos, although its use in soups still persists in some areas. Today the most general practice is to add rice and macaroni to the meat or fish cooking broth, with onion and salt as seasonings. In a few villages in the Kotzebue area, curry is used as a seasoning, a practice probably introduced by an early missionary or teacher. If there are family garden plots, as at Akiak and a few other interior river villages, potatoes, carrots or turnips may also be added. In very recent years, canned condensed soups, especially vegetable soup, are added whenever money is available for their purchase. Other canned foods occasionally added are meat balls and corned beef.

Alaskan Eskimos only occasionally fry meat or fish. The Athapascan Indians of Interior Alaska, perhaps from more consistent contact with Caucasians, often use this method of preparation, but even they seem to prefer oven roasting to frying. The Indians also use more of the various commercial condiments such as steak sauce on their cooked meats and fishes. For more detailed methods on cooking meat and fish products or otherwise preparing them, see Appendix.

USE OF COOKED, RAW-DRIED AND RAW-FROZEN MEAT AND FISH

In the overall Alaskan Eskimo and Indian diet four-fifths of the total protein came from meat and fish products, most of it of local origin. The relative importance of these two food groups depended upon the location of the village. In general, meat accounted for about one-half to three-fifths of the total protein in the diets of northern Eskimos and Indians. In contrast, among southwest Eskimos fish accounted for from about four-fifths of the total protein at the tundra villages of Kasigluk and Napaskiak to about one-half of it at Akiak (Table 75).

It was of interest to know the relative proportion of meat and fish eaten in the cooked, raw, raw-dried and raw-frozen state. This was determined for adults on the basis of total protein obtained from these food sources. It was found that about four-fifths or more of the meat protein on adult diets was from the cooked product. The raw-dried product was used in significant amounts only at Noatak, Akiak, Shishmaref, Newtok and Hooper Bay and the raw frozen product only at Shishmaref and Shungnak.

TABLE 75.—PERCENT TOTAL PROTEIN FROM MEAT AND FISH
Eskimo and Indian Diets: All Ages, Both Sexes
By Area and Village

Area and Village	No. Records	Percent of Total Protein		
		Meat	Fish	Combined
N. Central Athapascan				
Allakaket	257	45.9	31.7	77.6
Huslia	369	55.5	16.3	71.8
Northern Eskimo				
Noatak	462	46.4	36.0	82.4
Pt. Hope	362	64.0	8.5	72.5
Shishmaref	372	67.4	14.0	81.4
Shungnak	285	56.4	32.7	89.1
Southwest Eskimo				
Akiak	228	36.2	45.5	81.7
Hooper Bay	1212	19.9	62.3	82.2
Napaskiak	422	6.1	79.2	85.3
Newtok	247	12.3	74.9	87.2
Kasigluk	351	3.4	82.8	86.2
All Areas & Villages	4567	34.1	47.8	81.9

Most of the dried meat used at Noatak was from the summer ugruk and beluga catch; at Shishmaref from the spring ugruk catch; at Akiak from ground squirrel, bear and beaver; at Hooper Bay and Newtok from wildfowl, muskrat and mink.

In general, most fresh meats are available for short periods only, except for Noatak and Shungnak where in most years caribou are available from late fall throughout the winter; and at Point Hope and Shishmaref, where seal hunting is generally good throughout the winter season.

It was only at Point Hope, however, that large quantities of meat were frozen. Abandoned sod igloos were used as freezers and in most years these retained sufficient ice to keep the meat frozen or at least in cold storage throughout the summer. This meat, however, was cooked before eating it.

The underground ice cellars at Noatak are also quite effective in maintaining freezing and cold storage temperatures, but they are located at the village site while the ugruk and beluga supplies are obtained at the spring and summer camps on Kotzebue Sound 50 miles or more from the village, and the winter meat supply (caribou) several miles upriver from the village. Raw frozen meat was not a common item on Eskimo diets (Table 76).

FISH

Of the total fish protein intake on adult diets two-fifths was cooked, two-fifths was eaten raw-dried and the remainder was eaten raw-frozen. There was considerable variation, however, in the use of the dried, raw-frozen and cooked products at the several villages.

The bulk of the fresh fish supplies at all the study villages was available from about mid spring (late May and early June) throughout the summer and into the early fall. Air-drying was the most common method of preservation. A large share of the dried fish was used for dog feed at all the study villages. Under ordinary conditions of food supply, the northern villages and Akiak in the Southwest obtained sufficient fresh meat during the winter season to meet most of their protein needs. At the rest of the southwest study villages the fresh meat supply was extremely limited in winter, even at coastal villages located on Norton Sound. Ice conditions make sealing extremely dangerous in this area, therefore, most of the southwest people of necessity depend on their dried fish products as the major source of their protein from November to April. In the overall diet of the southwest Eskimo fish provided from slightly less than one-half of the total

TABLE 76.—PERCENT MEAT AND FISH PROTEIN FROM THE RAW-FROZEN, RAW-DRIED AND COOKED PRODUCT, ADULT MALE AND FEMALE DIETS
By Geographic Area and Village

Food	Athapascan		Northern Eskimo				Southwestern Eskimo					All Areas and Villages
	Allakaket	Huslia	Noatak	Point Hope	Shishmaref	Shungnak	Akiak	Hooper Bay	Napaskiak	Newtok	Kasigluk	
Fish: Cooked	43.8	16.6	83.4	77.6	34.8	39.8	66.6	61.3	41.2	33.3	47.2	41.7
Dried, Raw	32.2	73.3	13.6	21.1	5.4	4.5	1.5	12.1	49.0	62.1	50.1	41.2
Frozen, Raw	24.0	10.1	3.0	1.3	59.8	55.7	31.9	26.6	9.8	4.6	2.7	17.1
Meat: Cooked	97.9	96.0	70.4	98.7	74.3	85.1	61.8	82.6	99.9	85.7	100.0	80.1
Dried, Raw	2.1	4.0	29.6	1.3	11.7	0.5	36.4	13.7	0.1	14.3	.0	14.8
Frozen, Raw	.0	.0	.0	.0	14.0	14.4	1.8	3.7	0.0	.0	.0	5.1
Mean Daily Protein Intake (gm).												
Male, Adult	204.7	136.7	237.0	154.3	196.1	262.1	192.0	196.2	167.1	181.1	270.8	199.1
Female, Adult	139.5	122.3	217.7	137.1	172.2	186.4	192.7	173.3	144.6	155.6	230.2	169.6
No. Records, Both Sexes	88	99	199	178	177	130	103	490	199	110	152	1925

protein at Akiak to four-fifths of it at Kasigluk. The bulk of the fish was salmon obtained during the spring and summer fish runs. Raw-frozen fish was used in significant amounts by villages such as Shishmaref and Shungnak in the North, and Akiak and Hooper Bay in the Southwest where a modest but fairly consistent supply of the fresh product is available during the winter months.

USE OF VEGETABLES AND FRUITS

Kjellman(38), the Swedish botanist with the *Vega Expedition* (1878–79) was the first to draw attention to the fact that vegetable foods were used and relished by an arctic people. The members of this expedition, forced to spend the winter in the vicinity of the Chukchi coast of Siberia, had ample opportunity to observe these people. It was noted that when they partook of food on the VEGA that the Chukchi always showed preference for the vegetables used and even sought out diligently the tiny bits used in soups.

Kjellman also found that the Chukchi's winter supplies of locally obtained greens were sometimes as large as their stored winter meat supplies. He thought that the Chukchi differed from other polar peoples in this respect, and that their preference for vegetables probably stemmed from food experiences enjoyed prior to their northward migration. Although he had made botanical field trips to the American side of the Bering Straits, he never lived as intimately with the American Eskimos as he did with the Chukchi. Therefore, he could only draw his conclusions on their use of vegetable products from the reports of earlier arctic traveller-authors who had apparently never observed their use.

That local fruit and vegetables played little, if any, part in the diet was and is certainly true of those Eskimos inhabiting the "high arctic" where vegetation is sometimes extremely sparse. But, a significant segment of the Alaskan Eskimo population does live in areas where considerable quantities of wild edible berries, greens, roots and other underground plant parts are not only available, but are widely used.

The gathering of these foods in season is woman's work and many Eskimo women still spend considerable time and effort in obtaining as large a supply as possible. The kinds and amounts used and stored vary with the location and environs of the village as well as seasonal growing conditions. At Hooper Bay, for instance, where cloudberries are commonly found a woman may store from 150 to 300 pounds for winter use. She may also store an almost equal supply of lowbush cranberries, one or two gunny sacks (100# size) of "mousenuts" and lesser amounts of sourdock.

At Shungnak most families store 100--200 pounds of blueberries and lesser supplies of other local berries. Greens, mainly from *Polygonum alaskanum* and "mashu", the roots of *Hedysarum alpinum,* are sometimes stored in smaller amounts.

At Shishmaref the majority of families store up to a 100 pounds or more each of cooked sourdock and raw or cooked willow leaves, the latter marinated lightly with seal oil. They may also store from 50 to 200 pounds each of cloudberries, lowbush cranberries and crowberries, although the crowberries are most often mixed in with the sourdock. Noatak families may store 50 or more pounds each of cooked "mashu", lowbush cranberries and blueberries.

Most families at Napaskiak, Akiak and Kasigluk in the Southwest collect and store berries, mostly cloudberries and lowbush cranberries, but the older women in the village say not in as large quantities as was the custom in the past, probably because many no longer go to fall camps. Those with school age children remain at the village so the children can start school on time.

Lesser amounts of these products are used at Point Hope in the North, at Newtok in the Southwest and at the Indian villages. Supplies of these foods are not available at Point Hope village but the people formerly collected moderate supplies at their summer inland camps in the Cape Thompson and Cape Lisbourne areas. However, very few families now establish such camps regularly.

Berries are available at Newtok but because of the quaking bogs they are not as easy to procure. At the Indian villages a few families collect wild edible greens and berries but rarely in significant amounts. For the majority they are a rare seasonal treat only.

The people of St. Lawrence Island use many of the same greens in the same manner as that described for the Chukchi by Kjellman. On both St. Lawrence and Diomede Islands, stored greens eaten in combination with fresh walrus, seal or mukluk (bearded seal) meat and fresh oil are still favorite winter repasts.

Plant produce collected in considerable quantities by Alaskan Eskimos and Indians includes among the berries cloudberry, lowbush cranberry, crowberry and blueberry; among the greens "mare's tails", willow leaves, stonecrop, sourdock, wild rhubarb, marsh marigold, coltsfoot and sea purslane; among roots and other underground parts "mashu" or Eskimo potato, the roots and tubers of spring beauties, Indian rice and "mousenuts"; and seaweed and kelp. Many other berries and greens, usually available in lesser amounts or of more limited distribution are also used. They are described elsewhere(39).

On the mainland of Alaska, sourdock is the green collected and stored in the largest amounts. It is usually cooked in water to cover and mashed thoroughly. The Eskimos from Seward Peninsula usually add an equal amount of crowberries, but on St. Lawrence Island the cooked sourdock is put in seal pokes and stored without this addition. During the winter sourdock is either eaten as such with sugar and oil, used in making agutuk, or to make ahslookcahlak (St. Lawrence Island). The latter is a mixture of sourdock, seal oil and a little sugar with seal blood added when ready to eat.

The leaves of stonecrop, usually called *eveeahluk* on the mainland and *noneevuk* on St. Lawrence Island, are another very popular green collected and stored in fairly large amounts, especially by the Eskimos of Seward Peninsula and Diomede and St. Lawrence Islands. At the latter two places they are stored in barrels with water added to cover, the lid is weighted with rocks and then set in a cool place to sour. Or, it may be stored in seal pokes. On St. Lawrence and Diomede Islands the Eskimos relish these greens as a winter food, preferably eaten with fresh blubber, meat or duck liver.

Noneevuk is also used on St. Lawrence Island in making one of their popular agutuks. A piece of frozen *noneevuk* is either scraped with a sharp chisel to a powder or finely minced. Then walrus, whale, seal or reindeer fat, mixed sometimes with lard, hydrogenated fat, sea gull fat or cormorant fat, is gradually added, and the whole mixed slowly and thoroughly with the hands. Sugar is added to taste. The mixture is molded on a plate, left to cool and when ready is cut into small cubes and eaten.

Young, tender, smooth willow leaves are also very popular greens collected and stored in quantity for winter use by the Eskimos of St. Lawrence Island and Seward Peninsula north to Kotzebue. On the mainland the leaves, either cooked or raw, are first lightly marinated in seal oil and then stored in the cold, but on St. Lawrence Island the raw leaves are soured in the same way as is *noneevuk*. They are often eaten with bearded seal blubber or raw seal meat. Another old St. Lawrence recipe, rarely used now, is a mixture of about equal quantities of chopped willow leaves, seal blood and seal oil. This is called *ahkukuk*.

Mouse nuts, bits of the root and/or underground stem of various tundra plants, are still collected and used in good amounts at Hooper Bay and on St. Lawrence Island, but on Seward Peninsula they are rarely collected now. In the immediate past the people had been informed that food from mice caches was contaminated, but if these plant pieces are thoroughly cooked before eating, as is usual, the chance that they are a disease source should be negligible.

Adolph Murie(40) has described mice caches in his recently published "A Naturalist in Alaska." It is interesting to note that all of the root and other underground plant bits found in these caches by Murie are also well known to the Eskimo, and many of the Eskimo women who do the collecting, can describe the source plants adequately enough so that they can be easily identified by a botanist.

At Hooper Bay mouse nuts are stored, unwashed, in gunny sacks, but before use they are thoroughly washed and then used in special soups called *oknuk* (see Appendix), or they are cooked, finely chopped, and used as an agutuk ingredient. On St. Lawrence Island they are mashed after thorough cooking and eaten with blubber and raw seal meat.

"Mashu" is often collected in considerable quantity by Eskimos living in the Kotzebue Sound, Noatak, and Kobuk River areas and by many Indians living in the upper Yukon River drainage area. The women either dig the roots themselves or rob rodent caches. Before storage they are usually thoroughly washed and cooked. The Eskimos eat them with seal oil. In Eskimo country these roots are called "Eskimo Potato", while Athapascan Indians call them "Indian Potato". On St. Lawrence and Diomede Islands and at Wales, the fleshy roots and potato-like corms of certain of the spring beauties are sometimes collected in considerable quantity, cleaned, beaten or mashed and eaten with seal oil.

On St. Lawrence and Diomede Islands, along the Aleutian Chain and the mainland coast, seaweeds and kelp are gathered and used as food. Beginning in June St. Lawrence Islanders collect several different kinds of seaweed blown up onto the beach following a north wind. Often a sufficient quantity is harvested so that a portion can be dried for winter use. Seaweed is used both as a vegetable and as flavoring in meat and fish soups.

Eskimo Ice Cream or Agutuk: Most Eskimos and some Athapascan Indians make special desserts made from a mixture of fats and to which one of the following may be added:

1) *Berries*—cloudberries alone or a mixture of 2 or 3 kinds of berries.

2) *Cooked Sourdock*—or a combination of sourdock and berries.

3) *Cooked and chopped Eskimo Potato* (Mashu).

4) *Cooked and Chopped "Mouse nuts".*

5) *A combination of berries with salmon, whitefish or pike roe.*

6) *Berry combinations with the cooked flesh of pike, whitefish, or ling cod, or with the livers of these fish.*

Eskimos almost always use seal oil as one of the fat ingredients except possibly on the tundra where seal oil may be scarce or too costly. Here they may use whitefish oil or occasionally, when they can afford to buy it, cottonseed or corn oil. The actual ingredients used and the amounts depend not only on the village location and adherence to traditional methods of preparation, but more particularly on the immediate family food supplies. In the past few years, when money has been available for their purchase, cooked dry fruits have sometimes been substituted for local berries or used in combination with them.

Eskimo women do not have cook books, nor do they follow exact recipes, but a few approximate "recipes" for agutuk or Eskimo Ice Cream collected during the course of the food study are included in the Appendix.

IMPORTED FOODS: FACTORS DETERMINING THEIR USE AND PREPARATION

The introduction of new foods into the aboriginal diet pattern of the Alaskan Eskimo and Indian began as soon as these people came into contact with explorers, sailors, colonizers, traders and others. Although the Eskimos of the Bering and Chukchi Sea coasts had had trading relationships with the Chukchi, the Russians must be credited as being the first to initiate permanent changes in the diet. The foods they introduced, such as brown * and white sugar, tea, flour, crackers, rice, salt, butter, canned fruits (limited amounts) were used in addition to but not in place of local foods.(15,41) Where the Russian contact was of long duration as in southeastern Alaska, Kodiak, the Alaska Peninsula and the Aleutians, they successfully introduced gardening and the use of such vegetables as potatoes, rutabagas and onions. A favorite Russian dish on Kodiak Island, still in use today, is a tasty casserole of rice, onion, rutabagas and fresh fish. The Hudson's Bay Company introduced several of these same kinds of foods to the Eskimos and Indians of northern and north central Alaska(42).

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* The brown sugar was solid. The custom was to hold a piece between the teeth and sip tea through it.

After the purchase of Alaska by the United States an ever increasing number of outsiders—whalers, sailors, miners, traders, missionaries, teachers, servicemen and others came to Alaska. Gradually through their associations with the local Eskimo and Indian peoples other new foods and new food preparation techniques were introduced.

By and large, Americans are responsible for introducing canned milk (first condensed; later evaporated), oatmeal, cornmeal, baking powder, candy, lard, butter, margarine, edible beef tallow, hydrogenated fats, cookies, crackers (especially Pilot Bread, a hard ship's cracker and Jersey Creams), coffee, macaroni, dried fruits and, in more recent years, an ever increasing variety of canned and processed foods, the most popular being fruit (dried, fresh * and canned), fruit juices, instant cereals, cereals specially designed for infant feeding, syrup, pop (Kool Aid), gum, jams and jellies. Comparison of past inventories of food items for sale in local village stores with current lists shows the variety and amounts of imported food items available in some villages has markedly increased since World War II. Some of the newer items are prepared infant foods, dry cereals, cake mixes, peanut butter, canned seafood and meat products, various condiments such as prepared mustard, steak sauces, catsup, pickles, prepared pudding mixes, gelatins, dessert mixes, processed cheese and both whole and nonfat dry milk solids. On rare occasions fresh vegetables, fresh meat products and bakery bread may be shipped into a village, but usually only to those relatively close to major trading centers like Fairbanks and Anchorage. Cost is the primary deterrent to more widespread use. Airfreight charges added to the price of these items at the nearest retail market often increase the cost twofold or more. Recently, for example, an Eskimo from one of the southwest study villages who was in Anchorage attending National Guard Encampment, purchased fresh fruits and vegetables costing approximately $10.00. The airfreight charges were $10.75.

Because of ice conditions along the coast, food and other supplies are freighted by boat to accessible Eskimo and Athapascan Indian villages once or twice a year and only during the summer months. Generally, most of these supplies are exhausted by late winter or early spring. In the past, during the interim before the arrival of the next supply boat, Eskimos and Indians would

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* Fresh fruits are usually available only when the annual supply boat arrives.

revert almost completely to their aboriginal diet. Too often, however, this was the time of the year when local food supplies were also most likely to be limited. Except in those areas favorably located for late winter and spring hunting and fishing, the Eskimos frequently referred to this period of the year as the "hunger time." This general pattern of food shortage would probably be found in some areas of Alaska today except that emergency air shipment of food supplies is now possible.

The increase in monies obtained from welfare, unemployment insurance, social security, the National Guard, sale of handicrafts and furs, and seasonal wage work, has made possible shipment of larger and more varied supplies of foods than was formerly the case. Yet the kind and amounts of imported foods dispensed at village stores and trading posts is still very limited for several reasons. Shipping food to remote Eskimo and Indian villages by boat or airfreight increases the cost of each individual item. For example, a #2½ can of peaches costs about 38–45 cents in Anchorage, less during sales; the identical item costs 75–80 cents in remote villages.

A low and highly variable income and its preferential use for other types of goods further limits the use of imported foods. Lack of suitable warehouse facilities, especially those with adequate temperature control also limits the variety of foods which village stores can handle.

In spite of these factors new food items continue to find a place in the Eskimo and Indian diet. Children learn to like the taste and texture of foods served at the school lunch and ask for them at home. Increasing numbers of the people are leaving their villages for extended periods of time for schooling, occupational training, hospitalization, wage work and National Guard training where they are exposed to new food experiences. On their return to the villages foods especially well-liked are eventually stocked at the local store on demand and, depending on cost, may become commonplace in some family diets.

Many former villagers now living permanently either in urban areas of Alaska or outside Alaska return occasionally to visit their village relatives. While the desire for "native" foods is often given as a reason for the visits, the visitors generally bring a supply of "outside" foods with them. While visiting, they may teach their relatives new food preparation techniques to which they have become accustomed. This is particularly noticeable among young Eskimo and Indian women who marry Caucasians or who have worked as housekeepers and baby sitters for them in urban areas. If infants are brought along on these village

TABLE 77.—PER CAPITA SOURCE OF ELEVEN NUTRIENTS FROM SELECTED FOOD GROUPS

Alaskan Eskimo and Indian Diets: All Areas and Villages, All Seasons
All Ages, Both Sexes *

Food Group	Nutrient										
	Calories	Protein (gm)	Fat (gm)	Carbohydrate (gm)	Calcium (mg)	Iron (mg)	Vitamin A (I.U.)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Ascorbic Acid (mg)
Dairy	150	7.7	8.2	11.3	275	0.3	427	.055	.397	0.3	....
Egg	12	0.8	1.0	....	4	0.2	86	.006	.018	....	....
Meat	278	47.9	8.5	2.3	21	15.8	1338	.255	.827	10.0	....
Fish	400	67.1	12.6	0.7	80	2.3	1395	.260	.610	12.1	....
Fats as such	154	0.4	16.8	0.2	2	....	628	.005	.003	0.1	....
Fruits	88	0.7	3.7	14.3	9	0.4	392	.033	.026	0.4	23
Vegetables	36	1.5	0.8	5.6	9	0.5	727	.028	.039	0.4	5
Breads/Cereals	728	13.6	31.2	101.0	210	4.8	35	.582	.341	5.0	....
Sugar Products	142	0.1	0.2	36.7	4	0.3	....	.002	.003	....	....
Miscellaneous**	11	0.6	0.2	1.9	3	0.1	738	.350	.342	2.3	7
Mean Per Capita Intake	1999	140.4	82.2	174.0	617	24.7	5766	1.576	2.606	30.6	35

* 4567 Diet Records of 3 to 7 days each.

** Includes pharmaceutical vitamin preparations.

visits, a supply of commercially prepared infant foods is often brought along too. Public health nurses sometimes advise their use too. As a consequence prepared infant food products are gradually being stocked in village stores, particularly in the North where income from summer wages tends to be higher and more dependable from year to year.

The first village stores were all operated by traders, but through a Bureau of Indian Affairs loan program many villages have succeeded in purchasing the local store which they run on a cooperative basis through their local village council with advisory help from the loaning agency. In the past few years an increasing number of native Alaskans, especially Eskimos, have established privately owned and operated stores. Most of these stores have a small inventory and carry essentially the same types of food items and other goods as do the trader and village operated stores. At Newtok, for example, there were three stores, one owned and operated by the village and the other two by local families. All three carried essentially the same items and had about the same inventory value. Two villages, Napaskiak (population 175) and Kasigluk (population 182), had no stores of any kind. Napaskiak

TABLE 78.—PER CAPITA SOURCE OF ELEVEN NUTRIENTS ON ALASKAN ESKIMO AND INDIAN DIETS *
All Areas and Villages, All Seasons
All Ages, Both Sexes

Nutrient	Mean Per Capita Intake				
	Mean Daily Intake	From Local Foods	From Imported Foods	From Vitamin Preparations	From Mixed Preparations**
Calories	1999	735	1180	1	83
Protein (gm)	140.4	109.4	25.2	....	5.8**
Fats (gm)	83.2	29.0	49.5	....	4.7
Carbohydrate (gm)	174.0	2.9	167.0	....	4.1
Calcium (mg)	617	99	512	1	5**
Iron (mg)	24.7	17.0	6.5	0.3	0.9***
Vitamin A (I. U.)	5766	3380	1937	248	201***
Thiamine (mg)	1.576	0.462	0.980	0.092	0.042***
Riboflavin (mg)	2.606	1.332	1.091	0.088	0.095
Niacin (mg)	30.6	20.8	8.3	0.6	0.9***
Ascorbic Acid (mg)	35	13	14	2	6***

* 4567 Diet Records of 3 to 7 days each.
** Food mixtures from a combination of local and imported foods.
*** Mostly from local foods.

people made many of their purchases at a trader-operated store across the river and Kasigluk at the nearby village of Nunapitchuk. In summer and fall people from both of these villages purchased significant amounts at Bethel where their summer fish camps were located.

The yearly cash income of most Eskimo and Athapascan Indian families is low by present day U. S. standards. Because of this, they are not yet in a position to afford a suitable combination of purchased foods, either in kind or amount, which would assure them an adequate diet by modern dietary standards. Therefore, they will probably be dependent for some time to come on locally available game, wildfowl, fish, berry and vegetable products to assure them adequate intakes of most food nutrients.

Most of the imported foods now shipped into the villages fall into four major categories: dairy products, fats, grain products and sugar. These food groups contribute significantly (one-half or more of the per capita intake) to the calorie, fat, carbohydrate, calcium and thiamine intake (Tables 77 and 78).

A comparison of the estimated weekly per capita consumption of selected food groups by Alaskan Eskimos and Athapascan Indians with that of another group of U. S. citizens is presented in Table 79. Our figures are derived from the mean per capita caloric intake from ten selected food groups as found on 4567 diet records, both sexes and all age groups inclusive. From these data it was found that Alaskan Eskimos and Indians average about the same amount of meat in their diet as in the U. S. reference diet but in addition to the meat they consumed a nearly equal amount of fish. They also consumed more than twice as much bread and cereal foods. Their egg, milk, fruit, vegetable and sugar consumption, however, was considerably lower. Nutritionally, the Eskimo and Indian diet differed in that their protein intake was significantly higher but their calories, calcium, vitamin A and ascorbic acid contents were lower than in the reference diet (Table 79).

PREPARATION AND USE OF "IMPORTED" FOODS IN THE DAILY DIETARY

Just as the number of imported food items commonly used by Alaskan Eskimos and Indians is limited, so are the methods used in preparing them.

Cereals:

Usually quick-cooking types of cereal are preferred since they require a minimum of time and fuel for their preparation.

Breakfast cereals, however, are not commonly used. They are used more frequently in villages such as Allakaket and Shishmaref—where past teachers or missionaries taught and encouraged their use. Sugar and milk (usually canned evaporated milk) are generally added to cereals at serving time.

Rice is the most popular of the cereal foods. It is used most frequently as a soup ingredient but occasionally as a dessert with raisins, sugar and milk added.

Macaroni is another common soup ingredient, usually in combination with rice. It is rarely served as a separate food item.

The most common bread products used are crackers, chiefly Pilot Crackers (occasionally Jersey Creams or other crackers), homemade yeast and sourdough breads and hotcakes. White enriched flour is used in their preparation. At one village the women had been taught to use whole wheat flour usually half and half with white flour. Yeast breads are made according to the usual recipes, occasionally with milk but most often not. Milk is seldom used in the preparation of sourdough bread and hotcakes. Non-fat milk solids have only recently been made available at a few of the villages and are rarely used in bread-making.

The typical sourdough bread and biscuits are made from a thin batter of flour and water to which salt and soda may be added.

TABLE 79.—COMPARISON: CONSUMPTION OF SELECTED FOOD GROUPS
USDA(43) and Alaskan Eskimos and Indians
In Pounds

Food Groups	Estimated Weekly Consumption	
	USDA Per Person Annual Income $1250	Alaskan Eskimos and Indians*
Meat	3.8	6.5-(Meat 3.4) (Fish 3.1)
Egg	1.0	0.1
Milk and Milk Equivalent	8.4	3.4
Butter/Margarine	0.4	0.3
Fruit	5.9	2.2
Vegetables	5.6	1.6
Potatoes	2.0	
Sugar	1.3	0.6
Bread/Cereals	1.7	4.3

* 4567 Diet Records of 3 to 7 days each.

After thorough mixing, the batter is set in a warm area and allowed to sour. When ready to use, fat (lard or hydrogenated fat) and flour are added to make a stiff dough. The mixture is kneaded thoroughly and either baked in a hot oven or cooked in a greased skillet. At Kasigluk during the fall whitefish run, freshly rendered oil and fresh roe may be added to the dough which is fried in fresh whitefish oil. This makes a particularly delicious bread.

In many villages, especially in the Kuskokwim River Basin, baking powder is used in place of soda as the leavening agent. Most of the baking powder contains a calcium salt.

Sourdough batter is also used to make hotcakes, usually once a day in the morning. Those left over from breakfast are set aside and are available for eating whenever wanted. Margarine, butter or hydrogenated fat is sometimes used as a spread but most often they are eaten plain. Occasionally syrup or sugar may be used but this is not a common practice.

Either bread, hotcakes or crackers are served at every meal, frequently with a fat spread for the bread. Occasionally commercial jams are used but not often as they are quite expensive. Other breadstuffs such as soda crackers, saltines, graham crackers and cookies are seldom included except in the diet of the school child, usually in the school lunch program.

Commercial cake mixes are used to some extent in all villages, more so in the North than the Southwest, but cake is an occasional treat only, usually for birthday celebrations.

Fats:

The most common kinds of imported fats used are butter, margarine, hydrogenated fat, lard and edible beef tallow. Cottonseed and corn oil were rarely used at the Eskimo study villages and occasionally at the Indian villages. Peanut butter was occasionally included in the home dietary, but more frequently as a spread for bread and crackers at the school lunch. Bacon was a minor item on these diets and was used more frequently by Indians than by Eskimos. Hydrogenated fat and lard are used as a bread ingredient and some times as a spread, but butter and margarine are more commonly used for this purpose. Because margarine is cheaper it is rapidly replacing butter on Eskimo and Indian diets, and hydrogenated fat is replacing lard.

Hydrogenated fat and edible beef tallow are used in the preparation of the Eskimo "agutuk" mixtures, the tallow replacing the caribou and reindeer back fat formerly used. About 60 percent of the fat in the overall Eskimo and Indian diet comes from imported sources (Table 78).

Soup Additives:

Soups are a favorite dish particularly among the Eskimos. In addition to the rice and macaroni already mentioned, salt and onions (either fresh or dehydrated) are used as flavorings and occasionally other foods may be added. At Akiak, for example, where most families have a small garden plot, potatoes are added. Rutabagas or turnips are sometimes added but by only a few families.

For the most part gardens are limited to a few of the river villages where soil and other growing conditions are suitable and summer fishing activities can be carried on nearby. Gardens are possible in many other selected areas but they are not common, chiefly, because the people do not have sufficient time for caring for them. Summer fishing activities which demand much time and effort are, of necessity, given preference. Only limited supplies of fresh onions and potatoes are imported.

Occasionally a variety of imported food items may be added to soups either when a family has a little extra money to spend, or more often as an extender during periods of temporary local food shortage. The following are combinations added to the basic fish or meat cooking broth which appeared on some family diets:

1) Potatoes, canned tomatoes, rice and macaroni
2) Rice, macaroni, mixed dry vegetables and canned turnip greens
3) Canned beef stew, rice, macaroni and noodles
4) Canned spaghetti in tomato sauce and oatmeal
5) Canned corned beef, rice and macaroni
6) Canned corned beef hash, edible beef tallow and rice
7) Canned soup (pea, tomato, vegetable and vegetable-beef were the most popular), rice and macaroni
8) Macaroni, evaporated milk and catsup
9) Canned tomato soup, canned spaghetti in tomato sauce and bacon
10) Canned roast beef, canned beef and gravy or canned meat balls in combination with spaghetti in tomato sauce or canned soup
11) Canned hamburger, vegetable shortening and canned kidney beans

Cost limits the use of most of these canned products.

Vegetables:

Canned and fresh vegetables were not commonly found on Eskimo diets. Although used more frequently by Indians they were still limited. A favorite of the Indians appeared to be cream style corn.

Fruits:

Fruits of all kinds are well liked but cost also limits their use. Among the canned varieties peaches appeared to be the favorite and among the fresh varieties, oranges and apples. In areas where the summer supply boat can dock, such as at Bethel, the Eskimo will pay a very fancy price for almost any kind of fresh fruit available. Recently watermelons have been shipped in. When Eskimos and Indians have had a good wage work year, they may have some fresh fruit airfreighted in, particularly at Christmas-time. Since this procedure is very expensive it is not done often nor are large amounts ordered. Imported fresh fruits are a very minor item in the overall yearly dietary since they are available for such a limited time.

Milk:

Canned evaporated milk is the most common milk product used in the villages. It is used in various dilutions for the preparation of infant formulas, as a beverage for other children and as a cereal and coffee additive for most family members. Occasionally it is used in the preparation of American style ice cream (in winter time) and puddings, the latter mostly at the Indian villages.

An occasional village may still have a limited supply of condensed milk shipped in but its use is confined to trappers who find it more convenient than transporting evaporated milk in extremely cold weather.

Dry milk products were not used to any extent at any of the villages except at Allakaket where they used dried whole milk.

Sugar:

Sugar is a popular additive to reconstituted evaporated milk in children's diets. It is also used on cereal and fresh berries, in coffee (occasionally in tea) and as an ingredient in the preparation of the berry and other agutuk mixtures used by the Eskimo. The estimated per capita intake of sugar products in the overall Alaskan Eskimo and Indian diet appears to be about half that found in the general U. S. diet (Table 78). The Alaskan figure, however, includes only that from candy and pop and sugar used as a separate and measurable food item. That used in the preparation of the agutuks, cakes, puddings, breads and other homemade mixtures as well as that from canned fruit was not measured separately.

The total carbohydrate calories from fruit products, including the berry agutuk mixtures, however, accounted for less than 9 percent of the total intake of this nutrient on these diets (Table 80).

In general, imported foods provided most of the carbohydrate and calcium, well over half the calories, fat and thiamine, half the riboflavin, one-third of the ascorbic acid and niacin, two-fifths of the Vitamin A, one-fourth the iron, and one-sixth of the protein found in the overall Alaskan Eskimo and Indian diet (Table 78).

EATING HABITS OF ALASKAN ESKIMOS AND INDIANS

The usual Eskimo and Indian pattern of eating consisted of three meals a day with an occasional evening snack. A few individuals may also have a mid-morning or mid-afternoon snack or both. Evening snacks are very common in a few villages, for example, at Shishmaref, but in most cases they are confined to "movie night" or evenings when other village-wide affairs are scheduled.

The time for serving meals is by no means exact. Breakfast may be eaten from about 9:30 AM to noon; lunches from noon to late afternoon, and dinners from about 6 PM to late in the evening.

Some regularity in eating—i.e. 3 meals a day—is now customary since the clock has become important in regulating many

TABLE 80.—COMPARISON: ESTIMATED DAILY CONSUMPTION OF SELECTED NUTRIENTS
USDA(43) and Alaskan Eskimos and Indians
Per Person Per Day

Nutrients	Estimated Daily Consumption	
	USDA Per Person Annual Income $1250	Alaskan Eskimos and Indians*
Calories	3200	1999
Protein (gms)	103	140
Calcium (gms)	1.15	0.6
Thiamine (mgs)	1.56	1.57
Vitamin A (I.U.)	8540	5766
Ascorbic Acid (mgs)	106	35

* 4567 Diet Records of 3 to 7 days each.

villages activities. The store, the post office, the church and plane service to the village all have regular days and hours. From a review of the literature, it appears that in times past generally fewer than three daily meals were eaten, but this number increased during periods of plenty. Then, as now, meals were seldom served at specified times. Rather, the Eskimo and Indian ate when hungry or when hunting, fishing or traveling permitted.

Ray(44) reports from his observations made at Point Barrow in 1881 that "when food is at all scarce or while travelling they (the Eskimo) never eat but once a day, and it was a surprise to us to see them when on a journey, get out before daybreak and without a mouthful of food, make a journey of 30 to 40 miles before breaking fast; and they treated their dogs in the same manner, saying they travelled better when fed only at the end of the day's journey." This practice still persists under certain conditions, especially among the men who hunt seal and polar bear out on the sea ice in winter. The reason given is that one must be ever alert and watchful at such times and that a heavy meal or eating too much would dull the senses and encourage careless hunting behavior.

Weather permitting, hunters usually stay out on the ice during the total daylight hours. It is only after they return to their homes and have taken care of the dogs that they finally have a hearty meal. Hot food is always ready for them.

When women are actively engaged in hunting and fishing activities—and they have many such duties—they have little time for the usual housekeeping activities, including cooking and meal preparation. During the summer fish runs, for example, the women are entirely responsible for cutting the fish and preparing it for storage. In some areas, along the upper Kobuk River, for instance, they also have full responsibility for catching the fish as well. And during the winter months along certain coastal (Shishmaref) and river areas (Noatak) they have the major responsibility for gigging for fish through the ice holes. During these periods it is not unusual for the women to remain at their outside work for the entire day. Many take along a light lunch and possibly a thermos of hot tea or coffee.

Women have many other tasks to perform outside of the home—such as the butchering of seal, berry picking, gathering bird eggs and edible greens and roots, snaring ptarmigan, hunting muskrats and tanning hides. When they must engage in these tasks for long hours, they do as they did in the past—prepare a large pot of food just once a day. Other family members then help themselves whenever it is convenient. Women do, however, prepare and serve meals at regular hours if their husbands are locally engaged in wage labor such as on a major construction job. This is an unusual occurrence in most villages.

The three-meal-a-day pattern is most commonly followed during the school year. However, the Eskimo and Indian of today still feel that there is no particular need for the family to eat together and they seldom do so. The principal meal of the day is usually served in the evening as was the custom in the past.

Although the clock and the calendar are regularly taken along to hunting and fishing camps, they are not used to regulate daily living activities, but rather to help keep them abreast of village activities, such as the arrival of the mail plane. If camp and village are located in close proximity, there may be considerable traffic back and forth to make store purchases and to meet incoming planes.

While at camp both men and women work long hours. The young children play around camp or out on the nearby tundra or beach, coming back to camp to eat when hungry and to sleep when tired. The older girls have most of the responsibility for the care of infants and toddlers and may also do much of the food preparation.

At the village level, the three-meal-a-day trend and living more or less by the clock has been hastened by a number of factors. The most important appear to be:

1) The increased number of men—Eskimo, Indian and Aleut—who obtain seasonal (mostly summer) wage employment in mines, on construction jobs and at canneries more or less regularly. During such employment the men work, sleep and eat at fairly regular and designated hours, often eating at company mess halls. The same pattern is also followed by members of the Alaska National Guard at the time they attend the annual encampment.

2) More and more Alaskan Eskimos and Indians have had hospital experience, especially for tuberculosis, some of them for extended periods of time. The "three-meal-a-day and snack program" is common at the hospital.

3) An ever increasing number of youngsters are leaving the village to attend boarding school where meals are also served at regular and specified times.

The "Kasgha" or "Kashim" is still in existence as the men's community house in some of the southwestern Eskimo villages, but it is no longer used as their working, sleeping and eating quarters to the extent it was formerly(15,45). Only occasional feasts are held there now and at these times, as before, the men and boys eat by themselves and have special dishes prepared for them by the women.

CHILDREN'S EATING HABITS

During the school year children often prepare their own breakfasts before going to school, while the rest of the family still sleeps. This is not child neglect as we might interpret it in our culture, for it is still the custom to allow children to help themselves to whatever food is available and it is usually within their reach. But, like children the world over, they frequently sleep until the last possible moment and so do not have time for breakfast before going to school. When schools were first established in the villages, this was such a common occurence and, since a hungry child is not usually attentive in the classroom, many of the early village teachers found it more desirable to serve a breakfast at school rather than a noontime lunch. This is still the custom in some villages.

Because school and home are so near in the villages, children often run home at mid-morning recess for a snack even though they may have eaten a hearty breakfast at school. They sometimes go home, so they say on inquiry "to eat 'native' food," but often as not they will eat a cold hotcake or a piece of sourdough or pilot bread. Then at noontime they may play during the entire lunch period and go home again at the afternoon recess for another snack.

At some villages, children may eat one or more of their meals at someone else's house, either that of a relative or possibly at a namesake's house.*

For the most part, children still eat separately from the adults. For this and other reasons, it is often difficult for parents to observe them carefully, thus making children's diet records the most difficult to collect.

FOOD QUANTITIES EATEN

Many early explorers, whalers and others gained the impression that Eskimos, in particular, habitually ate large amounts of food, especially fat. This notion still persists, even though it has been refuted by careful observers since the early 1880's. Murdoch(46) stated, in regard to the Point Barrow Eskimo's consumption of fat that "the amount consumed, in most cases, is little, if any, greater than that eaten by civilized nations when we consider—they had no butter, cream, bacon, olive oil or lard."

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* Many Eskimo children have two names. An American one which is their legal name and appears on birth and baptismal certificates, legal documents and the school roster, and an Eskimo name. If the child is named after a living person this establishes a very special and valued relationship and, in essence, the child has two homes.

Petroff(15) writing about the southwest or Kuskokwim Eskimo states that "as a rule the Eskimo are moderate eaters. In the morning, the wife or some other female relative brings to the husband, father or brother who has slept in the Kashga (men's community building) a kantag or wooden bowl with cold water, together with a piece of dried frozen or boiled fish weighing perhaps a pound. After breakfast the men follow their various pursuits of hunting and fishing and sometime in the afternoon, after indulging in a sweat bath, they partake of another piece of fish or meat of about the same weight, with the addition of a tid-bit of rotten fish (tipnuk) or spawn – – – – – – An evening meal is frequently but not always partaken at home in the dwelling. The women and children always eat at home."

Jenness(47) states that in Arctic Alaska the principal meal, sometimes the only meal, was served in the evening. In his travels across Arctic America he found "that Eskimos often lived on fish and blubber, or on caribou and fish alone for weeks at a time." In one tent he visited the breakfast served consisted of "biscuits, ½ frozen fish apiece and strong tea. At the end of the day this same meal was repeated." He also found that children dined apart from their mothers but, he says, "that under normal conditions of food supply children were never hungry because as children they had the privilege of helping themselves to any food that lay within their reach and they exercised their privilege all day long." Petroff(15) also refers to the Eskimo indulgence of their children in regard to food. Gilder(37) forced by circumstances to spend the winter of 1878 in an Arctic Eskimo village, states that following a successful seal hunt, "that he who has the largest kettle or the biggest heart, when his own meal is ready, goes to the door of his igloo – – –, and calls out 'oyook, oyook', which means warm food, and all the men and boys gather in, each with a knife in his hand, and without further ceremony they fall to and devour what is placed before them." These oyooks according to Gilder "are merely festal occasions, though they might occur several times a day, and may happen any hour of the day or night when the Eskimos are assembled in villages and have plenty of food on hand." It is then, he says, that "they recompense themselves for starving in the past or in prospect."

C. L. Hooper(48), captain of the Revenue ship the CORWIN, noted on his visit to the Arctic in 1881 (he had hired Eskimos working aboard ship) that, "the Eskimo bolt their food but do not appear to be heavy eaters—we offered them all they could eat many times and generally found they were satisfied with what would make an ordinary meal for a white man and often with less—they drink enormous quantities of water and while travelling (by dog sled) take up handfuls of snow to eat." He also observed Eskimos ashore and found them moderate eaters. Dr. Irving Rosse, M. D.(49), physician aboard the CORWIN, in 1881, concurred in these observations.

It is understandable how the notion that Eskimos have large appetites gained credence. Most of the early trips made to the Arctic by whalers and others were during the summer months, a time of the year when most Eskimo people were either camped along specific coastal areas to hunt sea mammals or along the rivers to fish. Many of these observers were unaware that some of these people may well have been on short rations in the preceding late winter-early spring period. If such was the case, the Eskimo understandably might well have overindulged when suddenly confronted with plenty. He may also do so when an especially well-liked food, absent from his diet for a period, becomes available again. This occasionally happens today, as it did at Point Barrow in 1959. That year 15 baleen whale were caught after a three year period when none was obtained. The people did overindulge, especially in eating one of their favorite foods "baleen muktuk". As a consequence there was a run of patients with digestive upsets at the outpatient clinic of the Barrow USPHS Alaska Native Hospital(50).

Similarly, a teacher(51) at another northern Eskimo village, reported that at the first fall caribou kill, the hunters ate fantastic amounts of meat. Caribou had not been on their diets for several months.

It should also be mentioned that in the past the diet was particularly low in carbohydrates because sources of this nutrient were chiefly limited to that provided by berries, greens and animal organs. Scott and Heller(52) estimated that the calories from carbohydrates in their past diet probably averaged about 5 to 6 percent and never higher than 11 percent of the total intake. The Indian diet was also low in carbohydrate. Therefore, meat and fish products had to supply most of their calories.

The present study has shown that while there is an extremely wide range in nutrient intakes from very low to very high for all age groups, except possibly infants under 2 years of age, the mean daily intakes indicate that on the whole Eskimos and Indians are still moderate eaters. The mean caloric intake in 858 adult male diets was 2598, and in 1067 adult female diets 2167. These values are in fairly close agreement with those given by Rodahl(1).

SERVING MEALS

In most Indian and in many Eskimo homes meals are now served at a table. There are still some Eskimos, however, who prefer to sit on the floor around a square board, a piece of oilcloth or a low wooden platform upon which are assembled wooden trays or pots of prepared foods from which each person helps himself as long as the food lasts or until the appetite is satisfied.

EATING DISHES

Many Eskimos still follow the old custom of using individual eating dishes and drinking cups which are used by the same person at every meal. Since a wide assortment of crockery, china, glass and plastic dishes of varying sizes and shapes are now in use, this practice was helpful in determining more accurately the size of servings.

In former times, eating dishes were made of wood, cups of bone, wood or whalebone, and spoons and ladles of wood, bone or sheep's horn(42). Lantis(53) reports that on Nunivak Island eating dishes had special designs painted on them, some commemorating hunting achievements or possibly devised especially for a child by a relative. Only in museums can one see these early dishes, except for an occasional wooden bowl or Kantag. They, too, are becoming rare and only a few old men know how to make them. Wooden meat trays, however, are still made and used in many Eskimo homes; and wooden serving spoons of traditional village or family design are still made and used. (See illustration 23)

COOKING EQUIPMENT

The most common cooking vessels of the past depended on location and trade affiliations, and include the above mentioned wooden bowls (in the mid and lower Yukon and adjacent tundra areas), birch bark baskets (in the northern birch-forest areas), stone containers, or crude pottery bowls made of local clay reinforced with ptarmigan feathers and animal blood. Since some of these containers could not be placed directly over the fire, water was heated in them by repeatedly plunging red hot stones into the container until the desired temperature for cooking was reached and then adding the meat or fish and more hot rocks until the food was cooked to the right degree(54).

Through continued contact with traders new types of cooking utensils were introduced. They became popular because they were often nonbreakable and could be placed directly over the fire. They could also be easily transported as the people made their seasonal rounds from camp site to camp site. The first such utensils, obtained from the Russians and the whalers, were of copper and light sheet iron, although discarded tin cans were also used.* Eventually cast iron pots and pans were introduced and, in more recent times, aluminum cookware(41,42).

Large cooking kettles are preferred by most Eskimo families as it is still customary to prepare most foods in quantities sufficient for several family meals. Every family also has a frying pan, usually one made of cast iron. While it is primarily used to cook sourdough hotcakes, it may also be used on occasion for frying meats, fishes, and potatoes, and for making fry bread. It is occasionally used as an oven-baking dish for sourdough bread. Most families also have an assortment of loaf baking pans and muffin tins for bread baking.

THE WOMAN'S KNIFE

One of the most important utensils of the past which is still used by the Eskimo woman is the "woman's knife" or "ulu"(55). The Eskimo woman uses it for butchering sea mammals; cutting meats and fish preparatory to drying them; and often as a table knife. The ulu has many uses outside the kitchen too. It is used in place of shears to cut hides into patterns for parkas and other types of clothing. In some of the southwest tundra villages, young girls use small ulus for cutting the grass to be used as insulating material in their boots or mukluks.

In the past, the ulu blade was made of stone or slate, and occasionally of jade (in the Kobuk-Kotzebue area). They are now made with tempered steel preferably that from old saw blades (See illustration 22).

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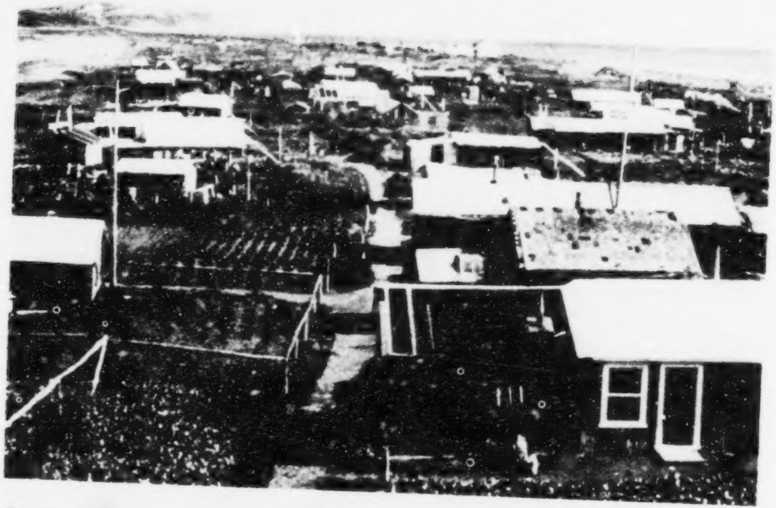
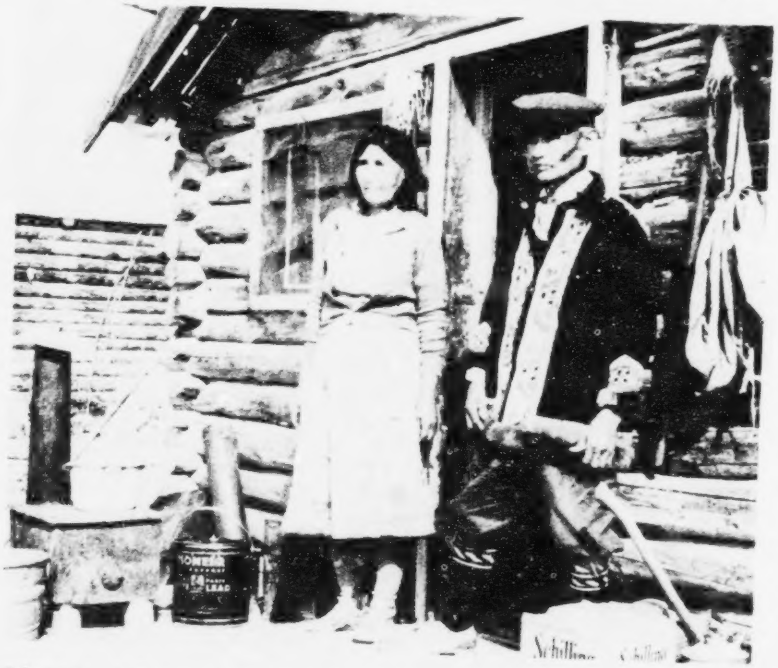
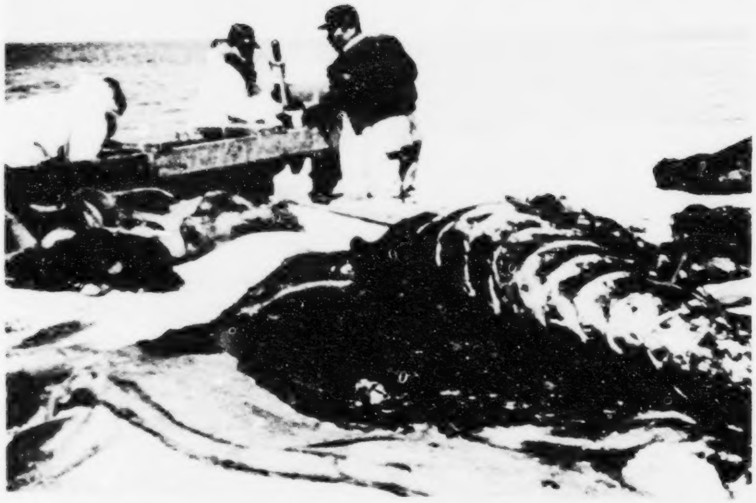
* Whaling ships carried canned meat products.



Family gardens at Unalakleet, Eskimo village located on Norton Sound, Bering Sea.



Athapaskan Indian man and wife in front of log cabin home at Tetlin. Note "Yukon stove" used outdoors in summer.

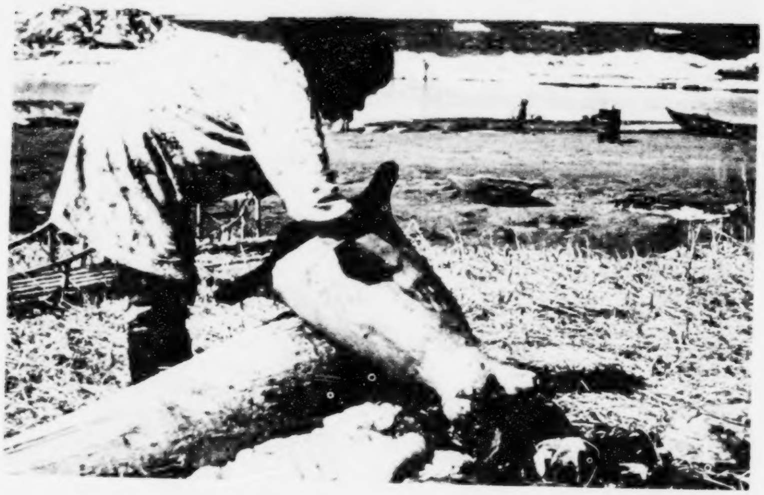


Ugruk catch, split and lying on shore ice ready for final butchering by women, Sealing camp, Shishmaref.

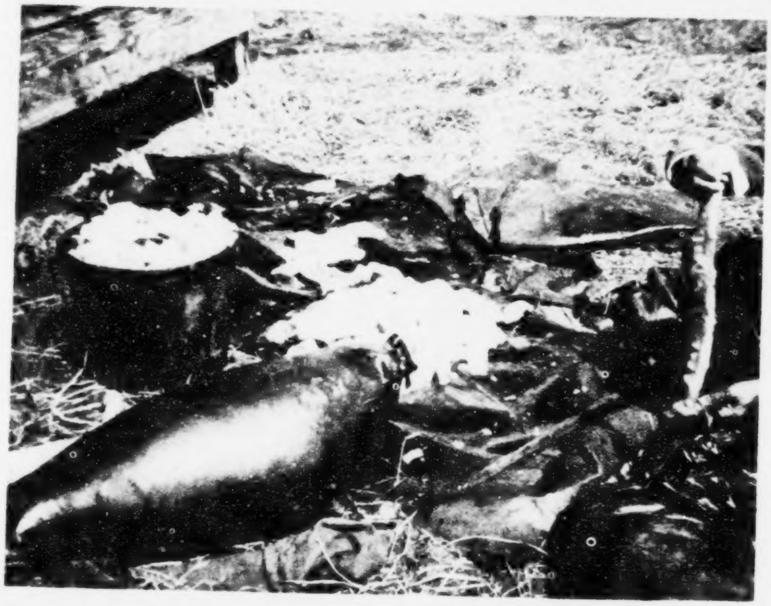
Eskimo woman (past 70 years of age) using the woman's knife or ulu, Sealing camp, Shishmaref.

Blowing up a seal poke to be used as a storage container for seal oil and other foods, Tununak, Nelson Island.

Eskimo woman scraping excess blubber from poke being prepared for storing food, Sealing camp, Shishmaref.



Smearing seal blood on poke to make it impervious, Shishmaref.



Stuffing blubber into seal poke, Tununak, Nelson Island.

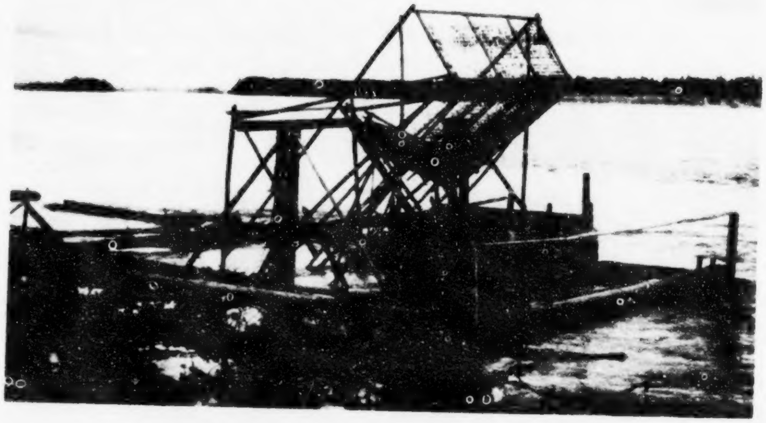
Walrus meat drying on racks, Gambell, St. Lawrence Island.

Butchering beluga whale on beach at Kotzebue.

Typical storage cache on stilts and sod house still in use, Akiak.

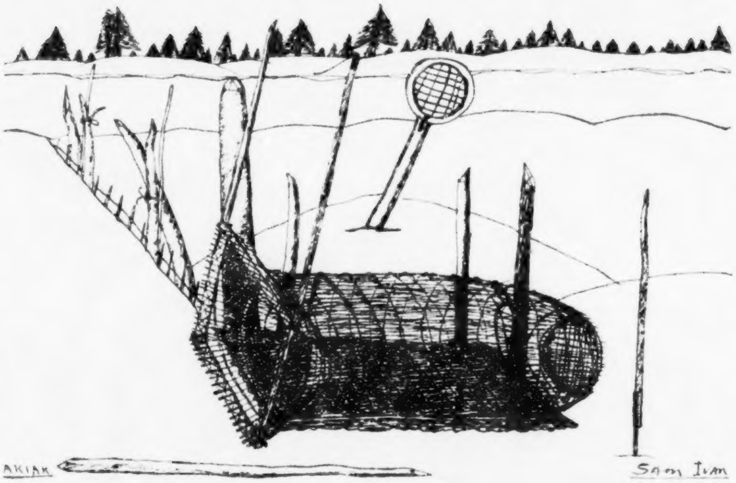
Preparing salmon for drying racks at summer fish camp on the Kobuk River.

Eskimo woman using ulu to prepare salmon for drying, Noatak.

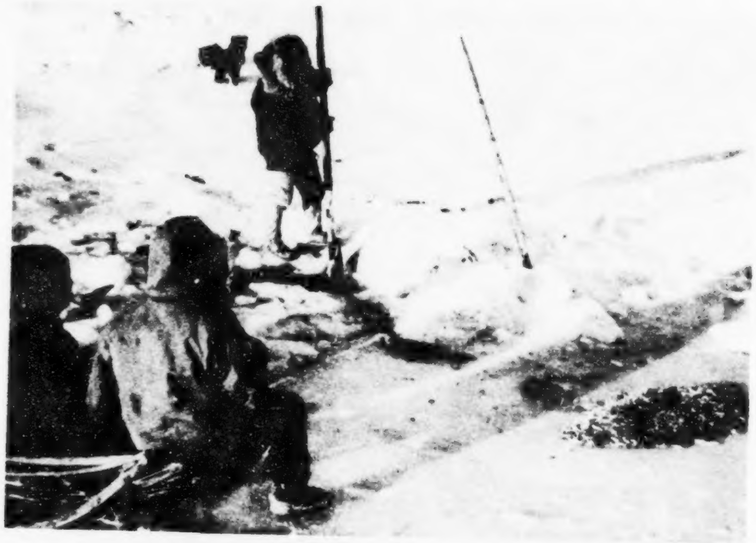


Fish wheel used by Indians to catch salmon, Nenana River.

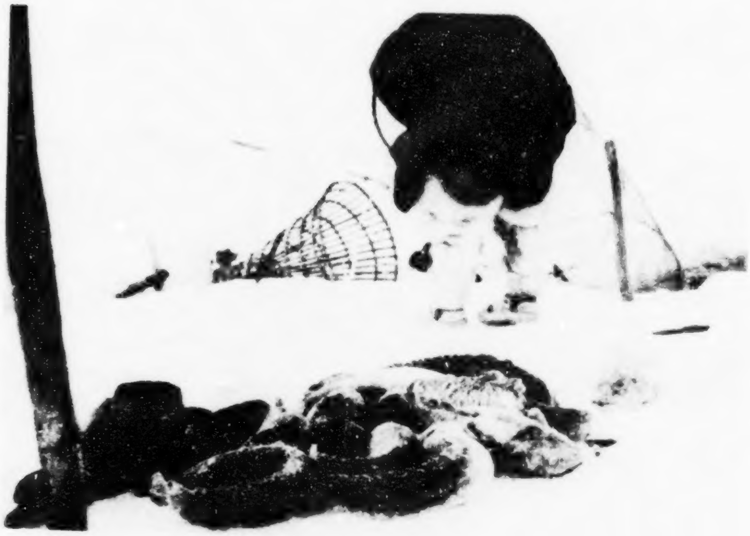
Young Eskimo woman braiding strings of herring for drying, Tununak, Nelson Island.



Fish trap made of spruce root used under river ice for catching ling cod and other fish. (Drawing by Sam Ivan, Akiak Eskimo)



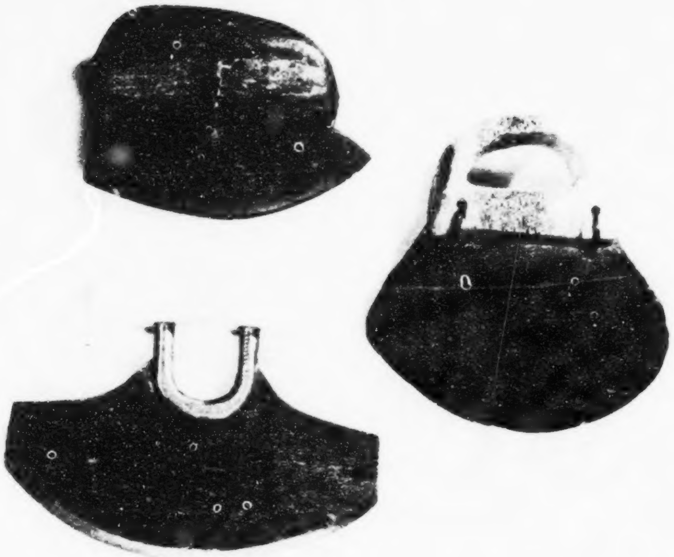
Dipping for needlefish through hole in the ice. Note pile of fish at right. Newtok.



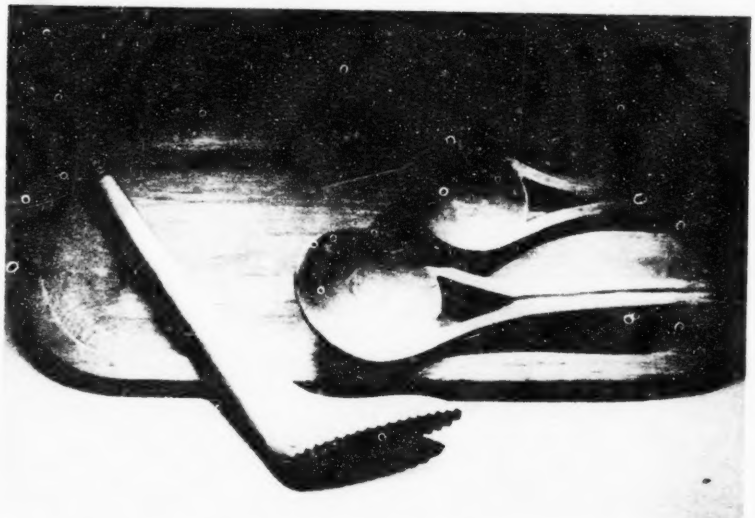
Removing ling cod from fish trap. Funnel is made of willow root, trap of chicken wire, Newtok.

Woman fishing through river ice for whitefish and arctic trout, Noatak.

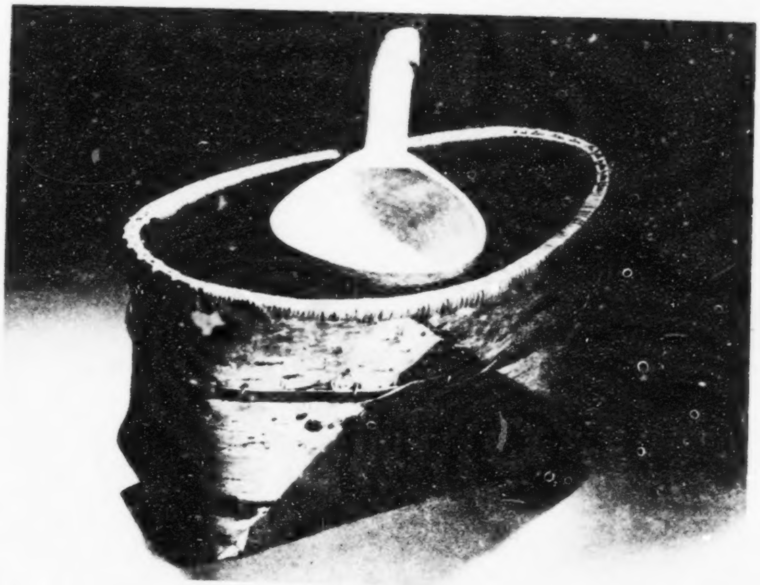
Eskimo woman jigging for tom cod through ice, Norton Sound, Bering Sea.



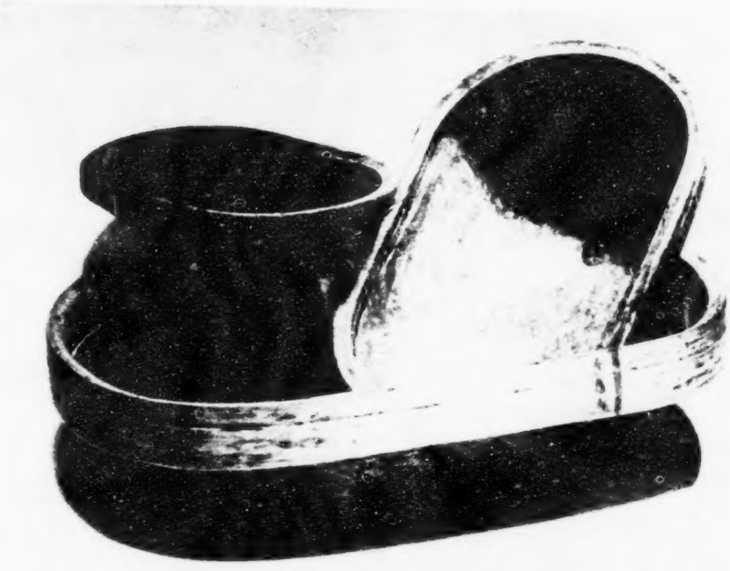
Ulu, Eskimo woman's knife. At top and right, old type ulus with bone handles and slate blades; bottom, modern type with tempered steel blade, usually made from used saw blade.



Spoons, masher (for berries and greens) from Shishmaref, and meat tray from Savoonga, St. Lawrence Island. All carved from driftwood.



Birchbark berry basket and wooden scoop carved from willow or spruce root, Shungnak.



Wooden serving or storage bowls made by both Eskimo and Athapaskan Indian men. Very few in existence now. Lower Yukon and Kuskokwim River area.

CHAPTER VI

SEASONAL FOOD QUEST ACTIVITIES

During the course of collecting food intake records for the Alaskan dietary study, we acquired considerable information concerning variations in food gathering activities in the different villages. These activities have been subject to drastic changes over the years. Natural phenomena such as severe storms or prolonged winters have been chiefly responsible for past changes at the local level. In more recent years the rapid increase in inter-cultural contacts has played an important part in changing food gathering patterns.

NATURAL FEATURES

Kroeber(56) gives Steensby the credit for being the first to "outline for the whole Eskimo territory the importance of shore line, seasonal open water, drift and shore ice, driftwood and timber, and other natural features as they determine the presence or accessibility of various animal species and their habitual movements." Steensby noted that "here seals are the important food; there whales or walruses or caribou or birds or salmon while others are as good as unavailable." Because of these differences from one village site to another in Alaska—as well as thoughout the rest of Eskimo and Indian territory across arctic and subarctic America—each village has developed its own individual yearly food quest cycle and has its own peculiar problems in relation to it.

Recent archeological investigations in Alaska are yielding evidence that ancient living sites in northern Alaska were more numerous than they were formerly thought to be. There is, of course, no single answer as to why various sites have been abandoned or why hunting activities have been modified. Irving(57) found evidence in the western Brooks Range area of "intensive occupation—indicating the area was once relatively rich in food resources—principally caribou." Today, only a small group of Eskimos live in this general area at Anaktuvuk Pass and they still depend primarily on caribou for their sustenance.

Giddings(58) recently excavated 300 sites on a series of 114 parallel beaches extending 1¾ miles inland and 200 feet vertically from the present beach at Cape Krusenstern. Carbon 14 dating indicates that the sites on the farthest inland beach—the probable location of the beach at the end of the Ice Age—was occupied about 5000 to 7000 years ago. It is thought that the succession of beaches was built up by "the combined effect of wave action and small cyclic changes in the sea level."

The only sites in use from late spring to late summer on the present beach at Cape Krusenstern are at Sealing Point and Sheshaulik from which vantage point Noatak Eskimos traditionally hunt seal, ugruk or beluga whale. Sheshaulik literally means 'the place of many beluga'. Incidental foods obtained in the general area are rabbits, wildfowl and their eggs, sourdock, berries and fish (trout and whitefish).

At Shishmaref (southwest of Cape Krusenstern) on the northwest shore of Seward Peninsula, the older people tell stories, handed down to them, describing the hunting of the baleen whale in the lagoon located in back of the present village site. They also say that whale bones can still be found at an old village site on the banks of the Arctic River which flows into this lagoon. The lagoon extends about 18 miles from the village to mouths of the Arctic and Serpentine Rivers. Evidence of whale hunting in this area is attested to by the fact that whale hunting spear heads have been excavated from an old village ruin located near the present village. Apparently, neither present day inhabitants of Shishmaref nor their immediate ancestors hunted this animal. Today, the ocean entrance to the lagoon is too narrow for the passage of these large whales.

The low gravel spit on which Point Hope is located has undergone rather drastic shore changes too, necessitating several local movings of the village site. A village was at one time located at the very point of the spit, called Tigara, which means 'points like a finger into the sea.' Most of the old dwellings at this site have long since been covered by the ocean. The few remaining have either been diligently excavated for artifacts—a source of income to the Point Hope people—or they are used as year-round cold storage caches for whale meat and other food products. In 1963 severe storms caused much damage along this end of the spit and many more of these old dwellings were completely destroyed.

According to Larsen and Rainey(10) Point Hope hunters used to take 15 to 18 whales a year, but this was before the concentrated hunting of the American whalers during the period 1850–1910. Today one to five whales constitute the usual yearly catch.

Van Stone(11,12) feels that fewer whales are now taken because of two important factors: first, there is a changed hunting attitude, particularly among the younger men who apparently are not as willing as the older hunters were to devote the time to it, and secondly, the careless handling of the powder used in their dart guns—the weapon that has replaced the spear in whale hunting—has definitely lowered the yearly take of this animal.

A VARIABLE FOOD SUPPLY

A hunting and fishing economy is at best unpredictable. One year there may be a superabundance of food; the next year the population may be reduced to starvation rations. Simpson(59) in reporting his observations and study of the Western Eskimos living along the north Arctic coast of Alaska tells of the extreme variability in the baleen whale catch there from year to year and the hardships resulting therefrom. In 1852–53, the year he was in residence, baleen whale were very scarce. He states that only seven small ones were caught at Nuwuk and that before the end of the winter the village was so short of food the people had to resort to eating the decayed flesh and blubber of a whale which had been beach-stranded two years previously about 25 miles distant from the village. Even this was apparently not sufficient for survival that year as he reports there were only four births in the village as compared to twenty-seven deaths, most of which were attributed to famine. During this same year at Cape Smyth—now called Barrow—about ten miles distant, he reports an additional forty people died of starvation, many of them while out actively hunting for food. On further inquiry Simpson found baleen whale were scarce in 1843–44, 1848–49 and 1850–51. The year, 1851–52 was one of plenty. Seventeen large baleen whales were caught and caribou was also plentiful. The following year, 1852–53, whales were again scarce as were most other food resources. This same pattern of alternating plenty and scarcity of whales persists today at Barrow. The 1958 Barrow whale catch was 15, but the three previous years none was caught.

In almost all the villages one hears stories which have been handed down describing starvation experiences. Present day Eskimos and Indians are as much concerned about this problem as were their ancestors. This is aptly illustrated by the welcome I received on my first visit to Shungnak in the fall of 1958. The people having learned via the radio that I was coming directly to their village from Noatak, greeted me at the plane with questions about the presence of caribou in the Noatak area. There was an audible sigh of relief when I told them that the caribou were already showing up in goodly numbers. This animal usually appears in the Noatak valley first—and then a short time later in the Kobuk and Selawik drainage areas.

Shungnak people depend primarily on salmon fishing in the summer and caribou hunting in late fall and winter to provide food for both themselves and their work dogs. Most of their caribou hunting is now done within a few miles of the village since their families stay in the village from September through May in order that the children may attend school. Formerly, family groups followed the caribou over a much more extensive area—up to or beyond a 50 mile radius from the present village site. If the caribou do not winter in the immediate village environs—as occasionally happens—the villagers are apt to go hungry during the winter months. Under such conditions the loss of dogs from starvation may be disastrous, for the dried salmon ordinarily set aside for their winter feed must be used instead for the family. Therefore, the very poor salmon run in the Kobuk River in the summer of 1958, added to their concern as to the whereabouts of the caribou.

THE FACTOR OF WEATHER

It sometimes happens that although a particular food may be abundantly available other factors prevent its proper utilization. The 1958 herring run in the Nelson Island area was exceptionally good, and in 1961 most of the salmon runs throughout Alaska were good to excellent. Unfortunately, both years, large quantities of these fish catches were spoiled by excessively wet summer weather. The Newtok people (Nelson Island area) lost about 50 percent of their herring catch, which is usually one of their chief winter dietary items. Undoubtedly, the resulting food shortage was the cause of the marginal inanition found among the Newtok people by the ICNND group in the later winter of 1958(23).

Eventually improved preservation and storage techniques may be devised to minimize these excessive food losses. For the time being, however, weather is still the most important factor in determining whether or not the proper drying of many local game and fish products is possible.

An old time practice in the Kuskokwim delta area, seldom seen today, was the use of grass mats to help protect the fish on rainy days. It is not known how effective this was, but it should be noted that most of the grass now collected is used to make baskets and mats to sell.

SOME EFFECTS OF ACCULTURATION ON FOOD QUEST ACTIVITIES

IMPROVED TRANSPORTATION SERVICES

One of the basic factors in bringing about the acculturation of Alaskan Eskimo and Indians in recent years, has been the establishment of regular transportation services to the remote villages.

In the days when transportation to the villages was relatively slow—primarily by dog team—acculturation proceeded at a fairly leisurely pace except, of course, in some of the coastal fishing and whaling areas and in certain interior mining and trapping areas. But since World War II the phenomenal development and expansion of air transportation throughout Alaska has brought a tremendous increase in inter-cultural contacts.

Previous to World War II, air service to most of Alaska's towns and villages was sporadic and used most frequently on a charter basis. As late as the mid 1940's, dog team travel to remote villages by nurses, educators and others was far from uncommon. Since then, however, there is hardly a village in Alaska, no matter how remote, that cannot be reached by scheduled plane service. The village airstrip is a permanent part of Alaska's transportation system, a part of an air highway system which takes the place of the surface routes common in the rest of the United States. Improvements in air service are constantly taking place.

Whenever they can afford it Eskimos and Indians like to travel by plane. Women like to have their babies at the hospital and many families will save money to provide for the necessary air transportation. In 1958 one Napaskiak family chartered a small plane to take them to their spring camp out on the tundra.

The airplane has made possible increased medical and public health services at the village level, transport of the sick to the hospitals, the children to boarding schools and the men to seasonal wage labor jobs more quickly. By the same token "outsiders" can get to the villages more quickly; hence, the increase in tourism to the villages, and the increase in arctic hunting activities by sportsmen.

One of the major results of these varied experiences and contacts both at the village level and away from the village has been an increasingly rapid modification of the aboriginal ways of life.

THE EFFECT OF THE BOARDING SCHOOL

Before village schools were established, a great many children were sent out to boarding schools where they often stayed the year round. Because of this, these children did not have an opportunity to learn from their families and village elders about the terrain and the ecological environment of the area in which their homes were located, the techniques required to wrest a living from it, nor the seasonal rhythm of the basic food quest activities. In times past children were customarily given many responsible tasks. At Hooper Bay, for example, they helped in the yearly wildfowl roundups, helped hunt and gather wildfowl eggs, and girls, particularly, helped gather greens and berries or cared for the smaller children while their mothers were engaged in these activities. The young boy's toys were often smaller editions of the hunting gear used by their fathers. In some areas, pre-teen age boys accompanied their fathers on hunting expeditions. There were many customs in relation to the boy's first kill some of which are still observed. At Shishmaref, for example, a boy's first seal kill must be given to the oldest man in camp.

In recent years improvements in air transportation have made it possible for the boarding school children to return home for the summer. While this has ameliorated the situation somewhat, many children are away from the village for about 9 months of the year and thus still miss participating in many of the seasonal activities.

Children sent away to school and hospital were the medium for introducing many dietary changes. They quickly became accustomed to new food tastes and textures. Those particularly relished soon became commonplace on the family dietary after they returned to their homes.

THE EFFECT OF A MONEY ECONOMY

A money economy of sorts was introduced early to many of these people, but it was quite limited and enjoyed primarily by those who lived in mining and trapping areas, or where commercial fishing was profitable and canneries were located. Since World War II, seasonal wage work at canneries and on construction jobs has been extended to many more Alaskan Eskimos and Indians. As already pointed out increased air service to the villages has made this possible.

Rainey(60) in his description of Point Hope in the 1930's stated that the village culture was "neither Eskimo nor yet western but a peculiar blend of both . . . that it was no longer a self-sufficient culture since it depended upon some products from the outside world." Most of this change he attributed to long association with the American whalers in the late 1800's and early 1900's.

Today, thirty or more years later, the same thing can be said of all Eskimos and Indians still living in their "native" areas. Every year they become more dependent upon an increasing number of imported products. The great diversity of products desired —such as specific kinds of lumber for home, boat, sled and snowshoe construction; material for fish nets; guns, ammunition, sun glasses, washing machines, outboard motors, gasoline camp stoves, lamps, radios, ready-made clothing and boots, coupled with their limited money economy, has restricted purchase of imported food items. For this reason local food products, chiefly meat and fish, are still the most important foods in their diets.

The desire for purchasable goods is the primary motive which prompts increasing numbers of these people to seek seasonal wage work. This results in a continuing modification of many of the seasonal food gathering activities, especially those normally occurring from late spring to about mid-fall.

Sometimes the desire for purchasable goods is so strong that the importance of maintaining the basic spring, summer and fall food quest activities is temporarily forgotten, and frequently these activities are abandoned altogether. Entire families are moving to more urban areas like Nome, Kotzebue and Bethel. Each year a few more families stay on at these centers permanently, while others may stay for a year or two struggling with intermittent and unpredictable work opportunities, eventually returning to their native villages.

COOPERATIVE EFFORTS TO SECURE LOCAL FOOD SUPPLIES

The majority of Alaskan Eskimos and Athapascans, however, make some sort of adjustment between these two means of earning a living at the village level, often displaying the adaptability for which they have frequently been commended. Several of the young men from Shishmaref, for example, have learned from experience that they cannot make enough money during the summer months to purchase both the goods they desire and food equivalent in amount and kind to that usually obtained from their traditional hunting and fishing activities. They have now returned to a more active spring (late May and early June) ugruk hunt, as was the custom in the past, for this animal, caught at this time of the year, is one of the chief sources of their winter meat and oil supply.

It is now the practice for those accepting summer jobs to leave the village at the last possible minute. If necessary the older men and the women are left at the village or nearby hunting camps to complete the food preservation and storage activities. The family may join the wage earner later if his summer job is not too distant from the village or they may stay in the village area throughout the summer to fish and hunt, to gather edible greens, roots and berries. Some men take their families to the place of employment but the majority have found transportation and living costs prohibitive.

EFFECT OF SUMMER WAGE WORK ON SEASONAL CAMP ACTIVITIES

In some areas the establishment of traditional summer and fall camps is no longer possible for many "partial" families left at the village. Transportation to their camps is sometimes quite hazardous, demanding the physical prowess and the guidance of experienced, able-bodied men. Occasionally, related families enter into agreements whereby the head of one family goes off to work for wages and the other stays at the village or camp to hunt or fish, each sharing with the other through mutual arrangements. The wage earner may "loan" his boat, outboard motor or other hunting gear or furnish gasoline in exchange for a designated portion of the fish catch or the hunt. Actually, many such arrangements are really an extension into modern times of cooperative family and village practices of the past.

Wage work, however, is more frequently obtained by the most vigorous and enterprising individuals who are usually also the most proficient and successful hunters. Hence, in spite of the above-mentioned mutual arrangements, the food quest activities normally engaged in at this time are the very ones that have been most drastically curtailed or modified. In years when wage work is not generally available, there may be an increase in local hunting and fishing activities, but in most villages there is a continuing decrease in the number of families who follow traditional food quest patterns. The following examples will serve to illustrate this situation:

At Point Hope, for instance, most families customarily spent the better part of the summer and fall along the coast or inland in the vicinity of Cape Thompson and Cape Lisbourne. There they obtained ugruk, brown bear, walrus, parka squirrels, caribou, wildfowl and other birds; gathered eggs from the neighboring cliffs; fished for salmon, trout and grayling and gathered berries. Today most families remain at the village throughout the summer. A few families may still camp along the coast near Jabbertown or inland on the banks of the Kukpuk River but the few active hunters remaining in the village often find it more expedient to make relatively short hunting and fishing trips inland. These activities no longer make as significant a contribution to local food procurement as they did formerly.

Hooper Bay is another example where many families are now "village-bound" practically the year round. No longer do the majority of them go to traditional coastal and tundra campsites.

EFFECT OF FISH AND GAME LAWS

Fish and game laws have also affected some of the major food quest activities of the people. In the Wade Hampton district in southwest Alaska certain wildfowl hunting practices, particularly the "rounding-up" of immature birds, have been discouraged by game regulations. These birds were not only a major source of food for these people, but in certain areas the skins were their most important and sometimes only source of material for parkas and bedding.

The enforcement of game and trapping laws has had other important effects on the food resources of these people. The most immediate is a reduction in the take of some animals, especially moose and beaver. In the long run these laws undoubtedly help to assure a more continuous supply of these animals throughout the years.

VILLAGE POPULATION TRENDS

Teachers, traders, missionaries, medical and public health personnel and others have also had an active part in bringing about some of the food quest changes. They have often discouraged widespread seasonal wanderings and encouraged stabilized village living in order to bring to the people formal education, public health services, medical care and local church, post office, modern transportation (mostly plane) and trade facilities. As a consequence, many small villages, settlements and seasonal campsites marked on early Alaska maps and mentioned in early census reports no longer exist. The tendency today appears to be for the number of villages to decrease and for those remaining to become larger. For example, between the 1950 and 1960 censuses in the Wade Hampton election district, seven villages were abandoned while only one new village was established. The total population of this district increased by 551 persons(61,14).

The population trend from U. S. Census Reports for the eleven study villages since 1920 is presented in Table 81. In seven of the villages there was a significant increase while four showed a decrease in total population. Increases occurred mostly in the southwest villages.

Population decreases in the northern Eskimo villages of Noatak and Shishmaref were due primarily to the fact that a significant number of the families moved to Kotzebue and Nome. At Shungnak, the decrease was due mostly to shifting population movements between the villages of Kobuk, Shungnak and Ambler (Table 82). These three villages are in close proximity and most of the inhabitants are interrelated in varying degrees. Ambler, formerly a seasonal fish campsite, has only recently become a permanent settlement again. It was established primarily to protect ancient fishing and hunting rights in the area.

Akiak was the only southwest Eskimo village showing a population loss between 1950–1960, but this was probably of a temporary nature. Three or four families had recently moved to a nearby mining community where they had obtained year round employment. These families still have "homes" at Akiak and may

TABLE 81.—COMPARISON TOTAL POPULATION CENSUS REPORT YEARS 1920–60(61-64,14) AND PERCENT POPULATION CHANGE 1940–60 (11 Study Villages)

Village	Total Village Population by Census Year					Percent Population Change 1940–60
	1920	1930	1940	1950	1960	
N. Central Athapascan:						
Allakaket	NA	NA	105	79	115	+9%
Huslia	NA	NA	NA	65	168	+158%[+]
Northern Eskimo:						
Noatak	164	212	336	326	275	—18%
Point Hope	141	139	257	264	324	+26%
Shishmaref	131	223	257	194	217	—16%
Shungnak	95	145	193	141	135	—30%
Southwestern Eskimo:						
Akiak	150	228	209	168	187	—11%
Hooper Bay	NA	209	299	307	460	+54%
Kasigluk	NA	32[#]	66	111	244	+270%
Napaskiak	NA	NA	67	121	154	+130%[+]
Newtok	NA	NA	NA	69[*]	129	+87%

NOTE: [+] Percent increase 1950 to 1960.
[#] Figure for Nunachuk, the old village for many present day Kasigluk people.
[*] Figure for Keyaluvik, the old village site of the Newtok people.
..... Figures unavailable
NA Figures unavailable

well return to the village when employment at the mine is no longer available.

The trend toward urbanization among these people is attested to by the more or less permanent increase in the Eskimo population at the urban centers of Kotzebue, Nome and Bethel (Table 83). Kotzebue was the site of an ancient trading center for the northern Eskimos. A small group of Eskimos lived in the area permanently but during the summer months Eskimos from as far away as Cape Prince of Wales to the south, from Noatak and Point Hope, and on occasion from Barrow to the north as well as the peoples from the upper Kobuk River area, assembled here for trade purposes. According to Shungnak elders, their ancestors went purposely to trade furs—obtained either by trapping or by

TABLE 82.—A COMPARISON OF TOTAL POPULATION THREE UPPER KOBUK RIVER VILLAGES
1940–60
U.S. Census Data(14,61,64)

Village	Total Village Population By Census Year		
	1940	1950	1960
Ambler			70
Kobuk	31	38	54
Shungnak	193	141	135
Total Population	224	179	259

TABLE 83.—A COMPARISON OF POPULATION CHANGE THREE ALASKAN COMMUNITIES
1920–1960(14,61-64)

City	Population (U.S. Census)				Percent Population Change 1940–60	Percent Eskimo Population in District* 1960
	1920	1940	1950	1960		
Kotzebue	221	278	376	1258	+353	91
Nome	852	1213	1559	2316	+91	75
Bethel	230	291	372	1290	+343	91

* Based on the population for the entire election district in which the town is located.

trade from the Koyukuk Indians—for hunting gear, ugruk rawhide, seal oil, oil lamps and a variety of other goods. Very few Kobuk Eskimos now go to Kotzebue in the summer.

While Kotzebue is still a trading center for a large part of the same area it is now primarily a reshipping center where groceries and other supplies are reshipped by plane, river barge or "cat" * to Noatak and the villages along the Kobuk River.

Part of the population increase in the villages is due to the decreased death rate among these people. The infant death rate among Alaskan Eskimos, for example, decreased from 87/1000 live births in 1950 to 72/1000 in the three year period 1959–1961(65). The population characteristics of the eleven study villages are presented in Table 84.

Many of the early observers noted that Eskimo families were generally small. Ray(44) states that he "seldom met a family with more than three children—though upon inquiry they may have some that 'sleep on the ground'." And Petroff(15) noted that "one or two was the common number of children to a family—that four was quite rare."

In the largest of the study villages, Hooper Bay, there were 77 households. The median number of children born to the household head and living at home was four. There were, however, 15 families with five, 10 families with six, 3 with seven, 4 with eight and 1 with 10 children. There were in addition, 13 adopted children and five being temporarily cared for by others in the village. An occasional family had as many as three adopted children.

Under present conditions of local food supply and monetary income opportunities, the population of this village is probably reaching a critical size. According to the residents some degree of local food shortage during spring and early summer occurs almost yearly; this was true even in times past, when the village was less than half the size it is today.

Wage earning opportunities are both limited and unpredictable in this area. Based on the 1958 Bureau of Indian Affairs economic report of earned income, the average yearly family income in Hooper Bay was estimated at approximately $940.00(13). Monetary help of some kind is required in most years to help tide families over until the wildfowl return to the area and the summer fish runs appear.

Two other Eskimo villages are located near Hooper Bay. Scammon Bay (1960 population 115) is about 20 miles to the north, and Chevak (1960 population 315) is about 20 miles to the south-

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* Heavy duty caterpillar.

TABLE 84.—POPULATION CHARACTERISTICS: 11 STUDY VILLAGES
(at time records were collected)

Village	Total Population	No. Households	Male							Female							Children—Both Sexes					
			70+	61–70	51–60	41–50	31–40	20–30	13–19	70+	61–70	51–60	41–50	31–40	20–30	13–19	6–12 M	6–12 F	1–5 M	1–5 F	1 Yr M	1 Yr F
Athapascan Indian																						
Allakaket	121	21	1	2	3	3	8	6	11	1	3	1	3	6	5	10	16	18	10	7	3	4
Huslia	143	20	2	2	3	5	4	11	20	1	0	2	4	4	7	5	17	25	14	11	3	3
Northern Eskimo																						
Point Hope	289	46	5	6	6	12	15	21	16	2	8	4	11	13	25	16	35	26	27	20	12	9
Noatak	287	50	2	6	9	9	14	22	21	0	5	10	6	8	30	14	30	26	28	31	9	7
Shishmaref	187	33	3	3	1	9	11	12	15	4	4	1	7	9	22	11	14	21	13	17	4	6
Shungnak	151	30	2	2	4	3	8	10	8	2	5	7	1	9	11	11	16	15	14	14	3	6
Southwest Eskimo																						
Akiak	187	29	3	1	5	11	9	17	14	5	3	4	9	7	13	12	20	10	17	16	3	8
Napaskiak	169	32	3	0	6	9	6	22	15	3	5	3	6	8	12	12	11	15	6	11	4	12
Kasigluk	170	27	2	2	2	10	7	13	18	4	0	2	6	9	9	10	13	15	7	25	7	9
Hooper Bay	431	77	2	2	9	10	31	34	34	2	1	8	11	25	27	24	49	50	45	29	21	17
Newtok	117	21	1	0	1	7	4	12	6	0	0	2	3	5	9	5	12	12	13	12	5	8
Totals	2252	386	26	26	49	88	117	180	178	24	34	44	67	103	170	130	233	233	194	193	74	89

TABLE 85.—TOTAL AND PERCENT POPULATION CHANGE:
HOOPER BAY, CHEVAK AND SCAMMON BAY
U.S. Census Data(14,63,64,61)

Village	Total Population and Census Year				Percent Population Increase 1940–1960
	1930	1940	1950	1960	
Hooper Bay	209	299	307	460	54
Chevak	*	43	230	315	633
Scammon Bay	*	88	103	115	31
Total Population		430	640	890	107

* Not Reported

east. According to the 1960 census data presented in Table 85, all three of these villages have had significant increases in their total population in the past twenty years. Part of this increase is due to the above-mentioned decrease in the infant death rate, and in part to the elimination of many small hamlets and camp sites in the general area.

In the 1880 census report(15) the population of Hooper Bay under the name Askinuk was 175, while that of Kashunuk, a neighboring village to the south, was over 200. Kashunuk no longer exists. Many of the residents moved to either Hooper Bay or Chevak.

Nelson(16) in his account of a dog sled trip to this general area (late 1870's) mentioned stopping at scattered small habitations composed of only two to three families. This is not the general pattern today, although occasionally one meets a family, such as the parents of one resident in Hooper Bay, who still prefers to live according to the old ways. Most of the year they live in the Black River area to the north of Hooper Bay making only occasional short visits to their son's family.

SEASONAL FOOD QUEST ACTIVITIES

In the large territory in which Alaskan Eskimo and Indian villages are scattered, terrain, climatic conditions and wildlife potential vary enormously. For this reason each village has developed an individual seasonal food quest pattern. Unless one is able to live in a village and follow the day to day activities over the

TABLE 86.—NUTRIENT CONTRIBUTION FROM FOOD SOURCE
858 ADULT MALE DIETS
All Areas and Villages, All Seasons

Food Source	Nutrients										
	Calories	Protein gm.	Fat gm.	Carbohydrate g.	Calcium mg.	Iron mg.	Vitamin A I.U.	Thiamine mg.	Riboflavin mg.	Niacin mg.	Ascorbic Acid mg.
Local Foods	1160	170.0	47.3	3.9	168	18.3	5387	0.716	2.116	31.9	16
Imported Foods	1327	21.9	54.2	195.4	380	4.8	1106	0.813	0.696	7.2	6
Mixed Food Preparations*	111	7.2	6.6	5.3	8	1.0	263	0.054	0.116	1.2	7
Mean Daily Intake	2598	199.1	108.1	204.6	556	24.1	6756	1.583	2.928	40.3	29
NRC Allowances**	2200-2900	70.0	....	....	800	10.0	5000	0.9-1.1	1.3-1.7	15-19	70

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* A combination of local and imported foods.

**NRC allowances, revised 1964 (74).

entire year, it is impossible to obtain an exact account of all the activities involved and their relative importance. After repeated visits to a village, however, it is possible to make a broad outline of them. A seasonal food quest outline is presented in chart form for each of the 11 study villages (Appendix V).

There is no question that the game, wildfowl, fish and wild edible vegetative products obtained by hunting, fishing and gathering activities are an important source of nutrients in the diet of the present day Alaskan Eskimo and Indian. In the overall diet of the adult male, for example, these foods are the major source of protein, iron, vitamin A, riboflavin, niacin and ascorbic acid and in addition provide slightly less than half the calories, fat and thiamine. Imported foods, on the other hand, are the major source of carbohydrate and calcium and provide slightly more than half the fat, thiamine and calories (Table 86).

SUMMARY

Between 1956–61, over 5000 food intake records of 3 to 7 days each for both sexes and all age levels were collected at 11 Alaskan villages; two Athapascan Indian, nine Eskimo. An analysis of these records showed that:

1. The most outstanding characteristic of these diets was the wide range in the mean daily intakes of all the major nutrients—from extremely low to extremely high—a clear indication that family and village food supplies fluctuate enormously throughout the year.

2. When mean daily intakes were compared with National Research Council recommendations, protein and niacin intakes were generally high; 75 percent or more of the diets were low in calories, calcium and ascorbic acid; one-third were low in vitamin A and thiamine; one-fourth were low in riboflavin. Although the mean daily intake of iron was adequate to high for all age levels, one-third or more of the diets for adolescents of both sexes, for pregnant and lactating women, for women over 60 years of age and for preschool children in the southwestern area were deficient by these standards.

3. Extremely high mean daily intakes of iron were common at all age levels except infancy, for those living in coastal areas where sea mammal meat was a staple in the diet.

4. No specific dietary adjustments were being made to help meet the increased metabolic need of pregnant and lactating women for calcium, iron and other important nutrients.

5. In general, vitamin preparations were important only for Eskimo school children who received them as part of the school lunch program.

6. There were significant seasonal variations in the intake levels of ascorbic acid and vitamin A which were, in general, highest in summer and fall. An exception was the higher ascorbic acid values found on the school child's diet in winter, due primarily to the afore-mentioned vitamin preparations given them at school.

7. The fat content of Eskimo and Indian diets was not excessively high. This nutrient supplied slightly more than one-third of the total calories on adult diets.

8. The breast feeding of infants was common up to two months of age. Formula feeding was the more common practice thereafter. A significant number of infants, some over 12 months of age, were being breast or formula fed without supplementation by other foods.

9. Analysis of the formula-fed infant's diet revealed that average daily intakes below the recommended levels were prevalent for calories, iron, thiamine, niacin and ascorbic acid. A significant number of mean daily calcium intakes below that recommended were found at the 6 to 11 month age level, increasing to over 50 percent for those 18 to 23 months of age. In general, average daily intakes of protein and vitamin A were adequate during the first 11 months of life but between 12 and 23 months one-fourth were low in protein and about one-fifth low in vitamin A. Imported foods, mostly milk and grain products, furnished the major portion of 9 of the 11 nutrients for which these diets were analyzed. Vitamin preparations and local food products were infrequently used.

10. Present day Alaskan Eskimo and Indian diets were found to be composed of a combination of imported and locally available foods. The kinds of local foods used and their nutritive importance in the diet depended primarily on the geographic location of the village. In the overall per capita diet, local foods supplied one-half or more of the protein, iron, vitamin A, riboflavin, niacin and ascorbic acid while imported foods supplied most of the carbohydrates and calcium plus one-half or more of the thiamine, calories and fat.

11. There were significant village and regional differences in the relative importance of local versus imported foods as sources of nutrients in these diets. For example: sea mammal fats were almost equally as important as imported fats in coastal Eskimo diets; in general, meat was the important protein source in the North, fish in the Southwest; meat was the major source of iron in the North, and certain whole fish in the Southwest; Indians obtained most of their vitamin A from imported foods, whereas Eskimos depended on local foods for this nutrient. Mean daily intakes of vitamin A were highest at villages where sea mammal oils and local greens were abundant. In general, grains were the major thiamine source at Indian and southwest Eskimo villages but local meats were equally important sources at the northern Eskimo villages. Northern Eskimos obtained about twice as much riboflavin from local foods as did southwestern Eskimos and Indians who obtained more than one-half of their intake from im-

ported foods. Most of the ascorbic acid in Indian diets came from imported sources while at certain Eskimo villages—north and southwest—local greens and berries were the major source.

12. Seasonal food quest activities of former times have been greatly modified in recent years because of the increased tempo in intercultural contacts, the change from a nomadic way of life to more permanent village living and the increase in seasonal (mostly summer) wage employment of many of the able-bodied men.

13. The money economy of Alaskan Eskimos and Indians is marginal by general U. S. standards. Most of their earnings are used for goods other than food. This fact, plus the high freight costs to the remote areas in which the villages are located, limits the use of imported food products primarily to milk, grains, sugars and fats.

14. The major changes in Eskimo and Indian diets since aboriginal times include: (a) an increase in the carbohydrate content of the diet which formerly was a source of no more than about one-tenth of the total calories but now furnishes about one-third of the total; (b) increased use of saturated fats, largely imported, particularly by the coastal and tundra Eskimos; (c) an increase in the calcium content of the diet primarily because of the use of milk; (d) a more limited use of local foods as nutrient sources in their diets for the reasons stated above.

15. The acculturation of the Eskimo and Indian peoples of Alaska has resulted in many changes in their infant feeding practices, the most notable being:

a. A drastic reduction in the number of infants being breast fed.

b. The curtailed use of local food resources to supplement the infant diet and the more frequent substitution of bread and cereal products for them.

16. Analysis of the formula-fed infant's diet has shown that a significant proportion of these diets are inadequate in calories, iron, thiamine, niacin and ascorbic acid when judged by NRC recommended allowances. The primary causes of these inadequacies are:

a. The abandonment of many former infant feeding practices.

b. The limited use of suitable local food products in season.

c. The low cash income among the majority of Eskimos and Indians.

d. Inadequate instruction in sound infant feeding practices especially the supplemental use of both suitable and nutritionally desirable local and imported foods.

BIBLIOGRAPHY

1. Rodahl, K. Studies on the blood pressure in the Eskimo and the significance of ketosis under arctic conditions. IV. Preliminary survey of dietary intakes and blood levels of cholesterol and the occurrence of cardiovascular disease in the Eskimo. Broggers Boktrykkeris, Oslo, 1954. (Norsk Polarinstitutt. Skrifter no. 102) p. 39–51.

2. Moorrees, C. F. A. The Aleut dentition; a correlative study of dental characteristics in an Eskimoid people. Harvard University Press, Cambridge 1957, 196 p.

3. Heller, C. A. Alaska nutrition survey report; diet report on four villages—Unalakleet, White Mountain, Kotzebue and Selawik, April 1947-June 1947. Territorial Dept. of Health, Juneau, Alaska, 1947. Mimeogr., 82 p.

4. National Research Council. Food and Nutrition Board. Recommended dietary allowances, 1958, publ. 589. Washington, 1958, 36 p.

5. Watt, B. K. Composition of foods, raw, processed, prepared, by B. K. Watt et al. Bureau of Human Nutrition and Home Economics, Washington 1950. (U.S. Dept. of Agriculture Handbook No. 8) 147 p.

6. Bowes, A. de P. and C. F. Church. Food values of portions commonly used. 8th ed., J. B. Lippincott 1956, 58 p.

7. Association of Official Agricultural Chemists. Official and tentative methods of analysis of the Association of Official Agricultural Chemists. 6th ed., Washington, 1945, 932 p.

8. Association of Vitamin Chemists. Methods of vitamin assay, 2nd ed., Interscience Publishers, New York, 1951, 189 p.

9. Rainey, F. G. The whale hunters of Tigara. American Museum of Natural History, New York. Anthropological papers, 1947. V. 41, pt. 2, p. 229–283.

10. Larsen, H. and F. G. Rainey. Ipiutak and the Arctic whale hunting culture. American Museum of Natural History, New York. Anthropological Papers, 1948, V. 42, 276 p.

11. Van Stone, J. W. An Eskimo community and the outside world. Alaska University, Anthropological Papers, 7 (1):27–38, 1958.

12. Van Stone, J. W. Point Hope; An Eskimo village in transition. University of Washington Press, Seattle, 1962, 163 p.

13. U.S. Bureau of Indian Affairs, Juneau Area Office. Annual statistical reports. (Income) Point Hope (1958), Noatak (1960), Shishmaref (1958, 1961), Shungnak (1959), Napaskiak (1958), Akiak (1959), Hooper Bay (1958, 1960), Newtok (1959). Juneau, Alaska. Mimeogr., unpaged.

14. U.S. Bureau of the Census. U.S. Census of population: 1960. v. I, Characteristics of the population. Pt. 3, Alaska. Washington, 1963, 231 p.

15. Petroff, I. Report on the population, industries, and resources of Alaska. In: U.S. Census Office. 10th census. (Census reports), Washington, 1884, v. 8, 198 p.

16. Nelson, E. M. A sledge journey in the delta of the Yukon, northern Alaska. Royal Geographic Soc., Proceedings, n.s. V. 4:660–670, Nov. 1882.

17. Brandt, H. Alaska bird trails. Bird Research Foundation, Cleveland, Ohio, 1943, 446 p.

18. Pauls, F. Alaska Department of Health and Welfare, Anchorage (personal communication).

19. Dolman, C. E. and H. Iida. Type E. botulism, its epidemiology, prevention and specific treatment. Can. J. Public Health 54 (7):293–308, 1963.

20. Denmark. Grønlands Styrelse. Nogle undersøgelser af grølandske levedsmidler of kostforhold. Beretning afgivet af Statens praktisk-sundhedsmaessige undersøgelser & Vitamin-laboratorium. København, 1955. (Its: Beretninger vedrørende Grønland, no. 3, I–II) pt. I, 123 p.: pt. II, 47 p. (English summaries).

21. Scott, E. M., R. C. Wright and B. T. Hanan. Anemia in Alaskan Eskimos. J. Nutr. 55 (1):137–149, 1955.

22. Porter, V. S., R. C. Wright and E. M. Scott. Anemia in western Alaska. In: Science in Alaska, 1953, 4th Alaskan Science Conference, Alaska Division, AAAS, p. 217–220.

23. Mann, G. V. et al. Health and the nutritional status of Alaskan Eskimos. A survey of the Interdepartmental Committee on Nutrition for National Defense, 1958. Am. J. Clin. Nutr. 11:31–76, 1962.

24. Scott, E. M. and C. A. Heller. Iron deficiency in Alaskan Eskimos. Am. J. Clin. Nutr. 15:282–286, 1964.

25. Deutsch, H. F. and A. D. Hassler. Distribution of vitamin B_1 destructive enzyme in fish. Proc. Soc. Exp. Biol. Med. 53:63–65, 1943.

26. Moyer, E. Z. et al. Nutritional status of mothers and their infants. Children's Fund of Michigan, Detroit, 1954. 91 p., 91 tables.

27. Macie, I. G. Composition of human colostrum and milk. Am. J. Dis. Child. 78:589–603, 1949.

28. Lawrence, J. M., B. L. Harrington, L. A. Maynard. The nicotinic acid, biotin and pantothenic acid content of cow's milk. J. Nutr. 32:73–91, 1946.

29. Macy, I. G. et al. The composition of milks; National Academy of Sciences—National Research Council, Washington 1953. Publ. 254, 70 p.

30. Kon, S. K. and E. H. Mawson. Human milk; wartime studies of certain vitamins and other constituents. London, His Majesty's Stationary Off., 1950, (Medical Research Council, special report series no. 269) 188 p.

31. Hammes, L. Arctic Health Research Center, Anchorage (personal communication).

32. Bailey, B. E., ed. Marine oils; with particular reference to those of Canada. Rev. from Bull. 59. Ottawa, 1952. (Fisheries Res. Board of Canada, Bull. no. 89) 413 p.

33. Totter, J. R. University of Arkansas. (Personal communication.)

34. Stefansson, V. My life with the Eskimo. MacMillan, New York, 1951, 538 p.

35. Cantwell, J. C. A narrative account of the exploration of the Kowak River, Alaska. In: U.S. Revenue-cutter Service. Report of the cruise of the revenue marine steamer Corwin in the Arctic Ocean, 1885, Washington 1887. p. 21–52.

36. Giddings, J. L. Forest Eskimos: An ethnographic sketch of the Kobuk River people in the 1880's. University Museum Bulletin Vol. 20 (2), Philadelphia, 1956. 61 p.

37. Gilder, W. H. Schwatka's Search: sledging in the Arctic in quest of the Franklin records. Charles Scribner, New York, 1881. 316 p.

38. Kjellman, F. R. Om tschukschernas hushallvaxter. In: Nordenskiold, N. A. E., Vega Expeditionens vetenskapliga iakttagelser, Stockholm, 1882, Bd. 1, p. 353–72.

39. Heller, C. A. Edible and Poisonous Plants of Alaska; Alaska University. College, Alaska, 1953, 167 p.

40. Murie, A. A Naturalist in Alaska. Devin-Adair, New York, 1961, 302 p.

41. Zagoskin, L. A. Account of pedestrian journeys in the Russian possessions in America in 1842, 1843 and 1844. Typewritten copy of translation by Mrs. A. Hotovitzky, 1935. (Copy in Library of Congress.)

42. Anderson, H. D. and W. C. Eells. Alaska Natives; a survey of their sociological and educational status. Stanford University Press, 1935, 472 p.

43. U.S. Department of Agriculture. Food: Yearbook of Agriculture 1959. Washington, 1959. 736 p.

44. Ray, P. H. Report of the international polar expedition to Point Barrow, Alaska, in response to the resolution of the House of Representatives of December 11, 1884. Washington, 1885, 695 p.

45. Nelson, E. W. The Eskimo about Bering Strait. U.S. Bureau of American Ethnology, 18th annual report, 1896–97. Washington 1899. Pt. 1. p. 3–518.

46. Murdoch, J. Ethnological results of the Point Barrow Expedition; 1881–1883. In: U.S. Bureau of American Ethnology. Ninth annual report to the Secretary of the Smithsonian Institution 1887–1888. Washington, 1892, p. 3–441.

47. Jenness, D. Dawn in Arctic Alaska. University of Minnesota Press, Minneapolis, 1957. 222 p.

48. Hooper, C. L. In: U.S. Revenue cutter service. Report of the cruise of the U.S. revenue-steamer Corwin in the Arctic Ocean, 1880. Washington, 1881, p. 1–134.

49. Rosse, I. C. Medical and anthropological notes on Alaska. In: U.S. Revenue Cutter Service. Cruise of the Revenue-Service Corwin in Alaska and the N.W. Arctic Ocean in 1881. p. 1–43.

50. Osborn, W. Alaska Native Health Service, Area Office, Anchorage, Alaska. (Personal communication).

51. King, G. Bureau of Indian Affairs School, Noatak, Alaska. (Personal communication).

52. Scott, E. M. and C. A. Heller. Nutrition of a northern population. Unpublished paper presented at the World Health Organization Conference on Medicine and Public Health in the Arctic and Antarctic, Geneva, 1962, mimeogr. 26 p.

53. Lantis, M. The social culture of the Nunivak Eskimo. In: American Philosophical Society Transactions, v. 35 Pt. III, p. 153–323, 1946.

54. Stoney, G. M. Naval Explorations in Alaska. In: U.S. Naval Institute Proceedings 25 (3):553–584; 25 (4):799–849, 1899.

55. Mason, O. T. The ulu or woman's knife of the Eskimos. In: U.S. National Museum. Annual Report, 1890. Washington, 1891, p. 411–16.

56. Kroeber, A. L. Cultural and Natural Areas of Native North America. University Press, Berkeley, 1939, 232 p.

57. Irving, W. N. Evidence of early tundra cultures in northern Alaska. In: Anthropological Papers of the University of Alaska. (2):55–58, 1953.

58. Sullivan, W. Ancient culture traced in Alaska. New York Times, Oct. 30, 1961 (discussion of unpublished work by J. L. Giddings).

59. Simpson, J. The western Eskimo. Observations on the western Eskimo and the country they inhabit. In: Royal Geographical Society. Arctic Geography and Ethnology, 1875. p. 233–275.

60. Rainey, F. A new form of culture on the Arctic coast. In: National Academy of Science Proceedings 27:141–144, 1941.

61. U.S. Bureau of the Census. Census of the population, 1950. v. II: Characteristics of the population, Washington, 1953. pt. 51–54 territories and possessions, pt. 51 Alaska. XIX, 87 p.

62. U.S. Bureau of the Census. Fourteenth census of the United States, 1920 Bull. Population: Alaska, number of inhabitants by judicial districts, Washington, 1921. p. 3–4.

63. U.S. Bureau of the Census. Fifteenth census of the United States, 1930, outlying territories and possessions. Washington, 1932, Alaska, p. 3–34.

64. U.S. Bureau of the Census. Sixteenth census of the United States, 1940. Reports on population, number of inhabitants by states. V. I, Alaska. p. 1–7. Washington, 1942.

65. Kester, F. E. Alaska's population as seen through its death rates. Alaska Department of Health and Welfare, Office of Statistical Services, Juneau, Alaska, 1962. Mimeogr. 6 p.

66. Heinrich, A. Report of food use on Diomede Island, U.S. Bureau of Indian Affairs, Juneau Area Office, Juneau, Alaska, 1948. Typewritten copy.

67. Rabeau, E. S. Botulism in Arctic Alaska: report of 13 cases with five fatalities. Alaska Medicine 1 (1) : 6–9, 1959.

68. Rodahl, K. The toxic effect of polar bear liver. J. Dybwad, Oslo, 1949. (Norsk Polarinstitutt. Skrifter no. 92) 90 p.

69. Rodahl, K. Hypervitaminosis A; a study of the effect of excess of vitamin A in experimental animals. J. Dybwad, Oslo, 1950. (Norsk Polarinstitutt. Skrifter no. 95) 206 p.

70. Fay, F. H. Arctic Health Research Center, Anchorage, Alaska. (Personal communication)

71. Sullivan, R. J. The Ten'a food quest. The Catholic University of America Press, Washington, D.C., 1942. (Anthropological series no. 11).

72. Hilliard, D. K. A preliminary report on the effects of low temperature on larval cestodes and other helminths in fish. J. Parasit. 45 (3):291–294, 1959.

73. Nordenskiold, A. E. The Voyage of the Vega. MacMillian, New York, 1882. 756 p.

74. National Research Council. Food and Nutrition Board. Recommended dietary allowances, rev. 1964 publ. 1146, Washington, 1964. 59 p.

75. Oswalt, Wendell Napaskiak: An Alaskan Eskimo Community. University of Arizona Press, Tucson, Arizona, 1963. 178 p.

GLOSSARY OF COMMONLY USED ALASKAN WORDS

AGUTUK

a whipped Eskimo dessert, the base of which is a mixture of fats in which either seal or fish oil is almost always used and to which either cooked ground caribou meat, cooked flaked whitefish, or berries alone or in combination with cooked sourdock greens, cooked chopped 'mouse nuts' or fresh fish roe is added.

BELUGA

the Eskimo name for the cetacean *Delphinapterus leucas* which inhabitats the shallow northern waters of sounds and estuaries.

BLUBBER

the fat layer which lies between the skin and muscular flesh of sea mammals (serves as an insulating layer) and from which oil is obtained.

CACHE

a term applied to the typical wooden storehouse erected on stilts and commonly used by the Eskimos and Indians of Alaska.

ESKIMO POTATO, INDIAN POTATO

Hedysarum alpinum L.—the root of a plant commonly called wild sweet pea which often grows in profusion along river banks and on river gravel and sand bars throughout Interior Alaska and more sparingly in alpine situations.

FREEZE-UP

a general term applied to the freezing of rivers, lakes and ground in late fall or early winter.

FRY BREAD

a baking powder biscuit dough or sourdough mixture fried in oil. Occasionally fresh whitefish roe is added to the batter and the bread fried in fresh whitefish oil.

BREAK-UP

a general term applied to the disintegration and disappearance of ice from rivers, lakes, sloughs and tundra in the early spring.

KASHIM

an Eskimo house of assembly, the men's community house.

KWAK

an Eskimo term applied to raw meat or fish when it is eaten frozen.

MIKIYUK

the Eskimo word for a specially prepared soured whale meat product.

M'LOOK

an Eskimo term for fermented raw fish eggs used in the preparation of a special dessert or as a soup thickener.

MOUSE NUTS

bits of edible roots, and other underground parts of tundra plants which rodents collect and bury in underground storage houses for their winter food supply.

MUKLUK

the southwestern Eskimo word for the large bearded seal, *Erignathus barbatus* (Erxleben); also a term generally used in Alaska for Eskimo boots, the sole of which is made from the tanned skin of the bearded seal.

MUKTUK

the Eskimo term for the outer skin and attached layer of blubber of the baleen and beluga whales—this is a favorite food in all areas where these animals are available.

NULLIKITUK

the Eskimo word for the annual whale feast held in June at Point Hope and Barrow in northern Alaska.

PICNIC

the most common Eskimo word for 'mouse nut'.

POKE FISH OR MEAT

fish or meat which has been partially air-dried, and then completely immersed in seal oil in a seal poke or other suitable container and then stored in the cold.

SEAL POKE

a container made from the skin of the seal. The animal is butchered in such a way that the skin remains intact except that the head and flippers have been removed. The skin as it is slipped off the carcass is turned inside out so that the hair side is now on the inside and the blubber side on the outside. The head and flipper openings are sewed, the skin inflated through the anal opening and tied; then all excess blubber is carefully and completely removed from the now outer surface and then smeared with seal blood and allowed to dry. The outer surface is now quite impervious and the 'poke' ready to be used as a container for oil, 'poke fish', 'poke meat', berries and cooked greens or raw greens marinated in seal oil.

SOURDOUGH

a semi-liquid fermented mixture made of flour, water and either baking soda or yeast starter which is used as a leavening agent in the preparation of breads and hotcakes; also a term designating a long time resident of Alaska.

TAYAHUK

the Eskimo name for the aquatic plant *Hippuris vulgaris* L. (common English name: mare's tails) which grows in shallow tundra ponds and ditches. After the ponds freeze in late fall and early winter the Eskimo gathers the leafy flowering stalk which protrudes above the ice, and uses it as a soup ingredient.

TINGUGTLUK

a whipped Eskimo dessert made from a mixture of fats in which seal oil or whitefish oil and cooked fresh fish livers (whitefish, pike, ling cod) are essential ingredients.

TIPNUK

a putrefied fish product made from either a combination of fish heads, liver, pancreas, and other internal organs or from whole fish (usually salmon). The fresh products are buried in grass lined ground pits and allowed to putrefy for specified periods.

TUNDRA

a level or undulating treeless, boggy plain dotted with lakes, ponds, sloughs, rivers and sometimes quaking bogs, a characteristic feature of many parts of the arctic and subarctic regions. The subsoil is permanently frozen; the upper soil, black and mucky, supports a dense growth of mosses, lichens and dwarf shrubs and herbs of various kinds.

UGRUK

the Arctic Eskimo term for the bearded seal (*Erignathus barbatus* (Erxleben)).

ULU

an Eskimo woman's knife with a crescent-shaped blade.

WILLIDULLI

a southwest Eskimo word meaning 'the place of many clams' applied to the slough in front of the tundra village of Kasigluk. A fresh water variety of clams is found in this slough.

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APPENDIX

LIST OF THE ANIMALS, FISHES AND PLANTS COMMONLY USED AS FOOD BY ALASKAN ESKIMOS AND INDIANS

ANIMALS

Beaver	*Castor canadensis* Kuhl
Bear	
black	*Ursus americanus* Pallas
polar	*Ursus maritimus* (Phipps)
Caribou	*Rangifer tarandus* (Linnaeus)
Hare	
snowshoe	*Lepus americanus* Erxleben
arctic	*Lepus timidus* Linnaeus
Lynx	*Felis lynx* Linnaeus
Marmot, hoary	*Marmota caligata* (Eschscholtz)
Moose	*Alces alces* Linnaeus
Muskrat	*Ondatra zibethicus* (Linnaeus)
Mink	*Mustela vison* Schreber
Porcupine	*Erethizon dorsatum* (Linnaeus)
Seal	
bearded (ugruk) (mukluk)	*Erignathus barbatus* (Erxleben)
harbor	*Phoca vitulina* Linnaeus
ribbon	*Histriophoca fasciata* (Zimmermann)
ringed	*Pusa hispida* (Schreber)
Squirrel, ground	*Citellus* undulatus (Pallas)
Walrus, pacific	*Odobenus rosmarus divergens* Illiger
Whale	
beluga or white	*Delphinapterus leucas* Pallas
bowhead or right	*Balaena mysticetus* Linnaeus

FISHES

Blackfish	*Dallia pectoralis* Bean
Cod (ling) (mudshark)	*Lota lota leptura* Hubbs & Schultz
Cod, tom	*Boreogadus saida* (Lepechin) and *Eleginus gracilis* (Tilesius)
Flounder	*Platichthys stellatus* (Pallas) and others
Grayling	*Thymallus arcticus* (Richardson)
Herring	*Clupea harengus pallasi* Valenciennes
Needlefish, sticklebacks	*Pungitius pungitius* (Linnaeus)
Pike	*Esox lucius* Linnaeus
Salmon	
dog or chum	*Oncorhynchus keta* (Walbaum)
king, chinook, spring	*Oncorhynchus tschawytscha* (Walbaum)
silver or coho	*Oncorhynchus kisutch* (Walbaum)
red or sockeye	*Oncorhynchus nerka* (Walbaum)
pink or humpback	*Oncorhynchus gorbuscha* (Walbaum)

FISHES

Smelts	*Hypomesus olidus* (Pallas) *Osmerus dentex* Steindachner *Mallotus villosus* Müller
Sculpin (devilfish-Nelson Island, bullhead-Shishmaref)	*Myoxocephalus* spp. *Megalocottus* spp.
Trout	
Dolly Varden	*Salvelinus malma* (Walbaum)
arctic char	*Salvelinus alpinus* Linnaeus
Whitefish	*Coregonus autumnalis* (Pallas) *Coregonus lavaretus nelsoni* Bean *Coregonus nasus* (Pallas) *Coregonus sardinella* Valenciennes
Sheefish, inconnu	*Stenodus leucichthys* (Pallas)

OTHER SEAFOOD

Crab	
king	*Paralithodes kamchaticus* (Tilesius)
at Point Hope	*Hyas coarctatus alutaceous* Brandt
Clams	*Clinocardium ciliatum* (Fabricius) *Hiatella arctica* (Linnaeus) *Mya truncata* (Linnaeus)
Tunicata	*Synocium pulmonaria* (Ellis & Scholander) *Synocium turgens* Phipps *Styela macrenteron* Ritter

WILDFOWL

Loons	
arctic	*Gavia arctica* (Linnaeus)
Yellow-billed	*Gavia adamsii* (Gray)
red-throated	*Gavia stellata* (Pontoppidan)
Cormorants	
pelagic	*Phalacrocorax pleagicus* Pallas
red-faced	*Phalacrocorax urile* (Gmelin)
Geese *	
Canada goose	*Branta canadensis* (Linnaeus)
Black brant	*Branta nigricans* (Lawrence)
Emperor goose	*Philacte canagica* Seevastinov
Snow goose	*Chen hyperborea* (Pallas)
Pacific white-fronted goose	*Anser albifrons* (Scopoli)
Ducks *	
common mallard	*Anas platyrhynchos* Linnaeus
pintail	*Anas acuta* Linnaeus
American widgeon	*Mareca americana* (Gmelin)

WILDFOWL

shoveler	*Spatula clypeata* (Linnaeus)
greater scaup	*Anthya marila* (Linnaeus)
common goldeneye	*Bucephala clangula* (Linnaeus)
old squaw	*Clangula hyemalis* (Linnaeus)
Steller's eider	*Polysticta stelleri* (Pallas)
common eider	*Somateria mollissima* (Linnaeus)
King eider	*Somateria spectabilis* (Linnaeus)
spectacled eider	*Lampronetta fischeri* (Brandt)
white-winged scoter	*Melanitta deglandi* (Bonaparte)
surf scoter	*Melanitta perspicillata* (Linnaeus)
red-breasted merganser	*Mergus serrator* Linnaeus
Grouse	
spruce grouse (spruce hen)	*Canachites canadensis* (Linnaeus)
willow ptarmigan	*Lagopus lagopus* (Linnaeus)
rock ptarmigan	*Lagopus mutus* (Montin)
white-tailed ptarmigan	*Lagopus leucurus* (Richardson)
Crane, sandhill	*Grus canadensis* (Linnaeus)
Gull *	
glaucous	*Larus hyperboreus* Gunnerus
glaucous-winged	*Larus glaucescens* Naumann
herring	*Larus argentatus* Pontoppidan
Kittiwake, black-legged	*Rissa tridactyla* (Linnaeus)
Murres * (crowbill)	
common	*Uria aalge* (Pontoppidan)
thick-billed	*Uria lomvia* (Linnaeus)
Guillemot	
black	*Cepphus grylle* (Linnaeus)
pigeon	*Cepphus columba* (Pallas)
Auklets	
crested	*Aethia cristatella* (Pallas)
least	*Aethia pusilla* (Pallas)
Puffins	
horned	*Fratercula corniculata* (Naumann)
tufted	*Lunda cirrhata* (Pallas)
Snowy owl	*Nyctea scandiaca* (Linnaeus)

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* Eggs used in quantity by some Eskimo groups.

PLANTS

ROOTS AND UNDERGROUND STEMS

Onion (teeveeteeuk, pahteetok)	*Allium schoenoprasum* L.
Spring beauty (keetuk)	*Claytonia acutifolia* Pall. ex. Willd.

Tuberous spring beauty (oatkuk)	*Claytonia tuberosa* Pall. ex. Willd
Indian potato,# Eskimo potato (mashu, muhzut)	*Hedysarum alpinum* L.
Parry's wallflower	*Parrya nudicaulis* (L.) Regel.
Wooly lousewort (nahzakmeetak, kooklingwuk)	*Pedicularis lanata* Cham. & Schlecht.
Silverweed, wild sweet potato	*Potentilla pacifica* Howell
Water sedge (kalugkat)	*Carex aquatilis* Wahlenb.
Tall cotton grass, mousenuts (picknuk or picnic)	*Eriophorum angustifolium* Honckeny
Pink plumes (cahuk)	*Polygonum bistorta L. ssp. plumosum* (Small).
Stonecrop (ekutuk)	*Sedum rosea* (L.) Scop.

STEMS, NEW SHOOTS, INNER BARK

Cow parsnip,# wild celery (young stems)	*Heracleum lanatum* Michx.
Mare's tail # (tayahuk) (leafy stem)	*Hippuris vulgaris* L.
Tall cotton grass (etak) (cheecheetok for new shoots)	*Eriophorum angustifolium* Honck.
Water sedge (new shoots)	*Carex aquatilis* Wahlenb.
Felty-leafed willow (keeleeyuk—the inner bark)	*Salix alaxensis* Cov.

LEAVES

Sea coast angelica, wild celery (ahzeeahiuk, egusuk)	*Angelica lucida* L.
Beach greens # (ahsahluk)	*Honckenya peploides* (L.) Ehrh.
Marsh marigold (tayahksungwuk)	*Caltha palustris* L. var. arctica (R. Br.) Huth.
Scurvy grass	*Cochlearia officinalis* L.
Dwarf fireweed (pahmeyutuk)	*Epilobium latifolium* L.
Sea lovage (cheecheekok)	*Ligusticum hultenii* Fern.
Mountain sorrel # (kungluk)	*Oxyria digyna* (L.) Hill.
Coltsfoot	*Petasites frigidus* (L.) Fries.
Wild rhubarb # (koosemuk)	*Polygonum alaskanum* (Small) Wight.

PLANTS (cont'd)

Pink Plumes (eevuk)	*Polygonum bistorta ssp. plumosum* (Small).
Pallas buttercup (kapugachat)	*Ranunculus pallasii* Schlecht.
Sourdock # (ahlooeguk)	*Rumex arcticus* Trautv.
Willow leaves # (surah)	*Salix pulchra* Cham. *Salix arctica* Pall.
Brook saxifrage (ahzeeahsak)	*Saxifraga punctata* L.
Stonecrop # (eeveeahluk) (noneevuk)	*Sedum rosea* (L.) Scop.

FRUITS

Alpine bearberry (kuvluk)	*Arctostaphylos alpina* (L.) Spreng.
Bearberry (kinnikinnik)	*Arctostaphylos uva-ursi* (L.) Spreng.
Crowberry,# blackberry (panak)	*Empetrum nigrum* L.
Red currant	*Ribes triste* Pallas
Wild rose (neechee)	*Rosa acicularis* Lindl. (most common rose)
Cloudberry # (akpik, ahtchaigpiat)	*Rubus chamaemorus* L.
Red raspberry	*Rubus idaeus* L.
Bog cranberry (wingarat)	*Vaccinium oxycoccus* Langs.
Blueberry # (soquah or sooguk-Eskimo), (chuck-Indian)	*Vaccinium uliginosum* L. and others
Low bush cranberry,# lingenberry (keepmik, toomalgleet-Eskimo) (nutlut-Indian)	*Vaccinium vitis idaea* L.

# Most common.

TABLE 87.—COMPOSITION OF ALASKAN FOODS, 100 GRAMS

Common Name	Scientific Name	Description		Moisture, gm	Protein, gm by Kjeldahl	Protein, gm by Difference	Fat, gm	Carbohydrate gm—Total	Carbohydrate gm—Fiber	Ash, gm	Calcium, mg	Phosphorus, mg	Iron, mg	Vitamin A, I.U. Carotene	Vitamin A, I.U. Vit. A(1)	Thiamine, mg	Riboflavin, mg	Niacin, mg	Ascorbic Acid, mg[2]
Bear, Black	*Ursus americanus* (Pallas)	Flesh		71.2	20.1	19.8	8.3	0	0	0.7		162	7.2		260	0.16	0.68	3.2	....
Bear, Polar	*Thalarctos maritimus* (Phipps)	Flesh		......	......	......	......	......	......	......	....	......	5.9	....	....	......	......	......	....
Beaver	*Castor canadensis* (Fuhl)	Flesh	1	67.4	......	26.8	4.8	0	0	1.0	....	265	......	....	....	......	......	......	....
			2	72.5	......	......	4.8	......	......	......	....	185	......	....	270	......	......	......	....
			3	......	......	......	......	......	......	1.0	15	262	6.9	....	180	0.05	0.14	1.9	....
Beluga	*Delphinapterus leucas* (Pallas)	Flesh		72.5	26.5	25.6	0.5	0	0	1.4	7	239	25.9	....	340	......	......	......	....
		Flesh, air-dried		23.3	73.1	71.0	2.3	0	0	3.4	28	608	91.7	....	530	......	......	......	....
		Eye, incl. adhering muscles, tendons and fat		55.1	19.6	......	23.3	0.7	0	1.3	....	187	......	....	1,870	......	......	......	....
		Flipper, excl. skin and bones		57.5	19.0	20.0	21.7	0	0	0.8	11	153	2.8	....	930	......	......	......	....
		Liver		74.6	18.4	......	3.9	2.0	0	1.1	11	230	......	....	22,100	......	......	......	....
		Muktuk: skin and sub-cutaneous fat		52.0	21.8	......	29.1	0.1	0	1.0	7	143	1.0	....	2,160	0.22	0.08	2.9	....
		Oil		......	......	......	......	......	......	......	....	......	......	....	2,310	......	......	......	....
Blackfish	*Dallia pectoralis* (Bean)	Whole fish	1	81.3	......	......	1.5	......	......	1.8	236	287	......	....	1,420	......	......	......	....
			2	78.9	15.5	......	2.0	1.0	0	2.6	....	......	4.6	....	985	0.01	0.37	1.9	....
Caribou	*Rangifer tarandus* (L.)	Flesh		70.3	......	23.9	4.7	0	0	1.1	....	......	......	....	....	......	......	......	....
		Bone Marrow		7.4	6.7	7.8	84.4	0	0	0.4	....	107	4.5	....	240	0.04	......	0.2	....
		Eye, incl. adhering muscle, tendon and fat		57.1	10.8	......	31.4	0.1	0	0.6	19	58	4.7	....	400	0.01	0.05	0.2	....
		Liver		71.4	15.0	......	5.9	6.8	0	0.9	4	282	15.7	....	28,800	......	......	......	....
		Stomach contents (lichens, moss, etc.)		78.3	5.1	......	2.2	12.3	......	1.6	47	209	5.8	....	3,400	0.01	0.29	1.9	....

Devilfish (sculpin)	*Myoxocephalus* ssp.	Tongue		62.5	13.7	14.1	22.8	0	0	0.6	6	150	2.8	....	190	0.12	....	....	....
		Flesh		....	....	....	....	....	....	1.4	12	274	0.4	....	1,020	0.09	0.10	1.1	....
Eiderduck	*Somateria spectabilis* L.	Flesh		75.6	21.7	21.4	2.1	0	0	0.9	10	220	....	....	....	....	....	....	....
Fireweed	*Epilobium latifolium* L.	Young leaves		87.2	3.0	....	0.8	6.3	0.9	1.6	13	89	2.1	5720	....	0.04	0.86	1.4	99
Flounder	*Platichthys stellatus* (Pallas)	Flesh, air-dried		9.6	70.4	67.8	14.2	0	0	....	....	....	....	....	....	....	....	....	....
Goose, Canada	*Branta canadensis* (Ridgway)	Flesh		....	....	....	....	....	....	1.6	....	312	5.6	....	F	0.28	0.46	9.3	....
Herring	*Clupea harengus pallasi* Valenciennes	Flesh, air-dried		37.5	44.7	46.7	10.6	0	0	....	....	972	....	....	F	0.01	....	8.6	....
		Flesh, air-dried, preserved in seal oil		18.2	....	44.5	34.6	0	0	2.7	....	684	....	....	1,300	0.01	....	2.2	....
		Roe		....	....	....	....	....	....	1.3	....	312	0.9	....	490	0.15	....	1.4	....
		Roe, air-dried		27.3	60.4	....	6.6	2.8	0	2.9	29	808	....	....	F	0.05	0.17	4.1	....
Ling cod (lush)	*Lota lota leptura* (Hubbs & Schultz)	Flesh	1	79.3	....	....	0.3	....	....	....	....	....	0.6	....	....	....	....	....	....
			2	79.6	....	19.1	0.3	....	....	1.0	....	....	....	....	....	....	....	....	....
			3	80.4	17.4	17.0	1.1	....	....	1.5	....	....	....	....	....	....	....	....	....
			4	79.2	....	....	0.7	....	....	....	....	....	....	....	230	0.09	0.48	....	....
				....	....	....	....	....	....	....	....	....	....	....	....	0.13	0.23	....	....
		Liver	1	....	....	....	....	....	....	0.5	5	123	1.0	....	9,100	0.22	....	4.2	....
Lingenberry	*Vaccinium vitis idaea* L.	Berries		86.7	0.4	....	0.5	12.2	1.3	0.2	26	21	0.4	90	....	0.02	0.08	0.4	21
"Mashu"	*Hedysarum alpinum* L.	Roots		67.8	5.8	....	2.4	22.6	....	1.5	....	67	....	16	....	0.10	0.07	1.3	11
Mink	*Mustella vison* Schreber	Flesh, air-dried		9.6	63.2	64.8	9.2	....	....	3.6	....	821	39.7	....	F	....	....	....	....
Moose	*Alces alces* L.	Flesh	1	....	....	....	0.9	....	....	1.6	....	226	....	....	....	....	....	....	....
			2	....	....	....	2.1	....	....	1.6	....	218	6.7	....	....	....	....	....	....
			3	73.8	....	....	2.4	....	....	....	12	210	5.7	....	....	....	....	....	....
			4	72.4	....	24.5	2.0	....	....	1.1	....	203	2.7	....	310	0.09	0.18	....	....
		Liver		73.5	....	....	4.3	....	....	....	....	429	....	....	96,600	....	....	....	....
"Mouse nuts"	*Polygonum* sp.	Roots		77.2	3.9	....	0.1	16.1	....	2.1	22	175	....	150	....	0.01	0.04	0.1	16
"Mouse nuts"	*Eriophorum* sp.	Seedlings		73.0	7.3	....	1.1	16.3	....	2.3	17	150	....	340	....	0.01	0.14	1.0	8
Muskrat	*Ondatra zibethicus* L.	Flesh		....	....	....	....	....	....	1.2	....	220	8.6	....	....	0.10	0.66	6.2	....
Needlefish	*Pungitius pungitius* L.	Wholefish	1	74.2	....	....	6.4	....	....	2.9	....	605	7.3	....	....	....	....	....	....
			2	80.4	9.9	....	6.2	1.1	0	2.6	93	624	5.0	....	1,230	0.05	1.38	....	....
Oogruk (bearded seal)	*Erignathus barbatus* (Erxleben)	Flesh		....	....	....	....	....	....	1.1	....	198	12.9	....	....	0.20	0.26	5.9	....
		Flesh, air-dried		11.6	82.6	82.4	2.3	0	0	3.7	....	784	49.6	....	1,310	0.13	0.63	....	....

TABLE 87.—COMPOSITION OF ALASKAN FOODS, 100 GRAMS—Continued

Common Name	Scientific Name	Description		Moisture, gm	Protein, gm by Kjeldahl	Protein, gm by Difference	Fat, gm	Carbohydrate gm—Total	Carbohydrate gm—Fiber	Ash, gm	Calcium, mg	Phosphorus, mg	Iron, mg	Vitamin A, I.U. Carotene	Vitamin A, I.U. Vit. A	Thiamine, mg	Riboflavin, mg	Niacin, mg	Ascorbic Acid, mg
Oogruk		Oil		...	...	...	...							...	8020	...	...	...	...
"Oopah" ("Obak")	*Tunicata*	Whole animal		80.2	11.7	...	2.2	3.1	...	2.8	53	106	20.7	...	F	...	0.10	0.9	...
Owl, Horned	*Bubo virginianus* (Gmelin)	Flesh		71.3	22.7	22.3	5.0	0	0	1.4	16	218	4.8	...	350	...	...	...	...
Pike	*Esox lucius* L.	Flesh	1	76.3	...	...	1.1	0	0	...	...	265	0.4	...	...	...	...	...	...
			2	...	...	...	...	...	...	...	...	204	0.7	...	...	...	...	...	...
		Flesh, air-dried		...	...	...	...	...	...	3.0	...	623	0.9	...	140	0.11	0.33	12.0	...
		Liver		...	...	...	...	...	...	...	...	...	...	...	860	...	...	...	...
Ptarmigan, Willow	*Lagopus lagopus* (L.)	Breast Muscle		71.5	...	24.8	2.5	0	0	1.2	...	268	6.2	...	420	0.25	1.00	...	...
Buttercup	*Ranunculus pallasii* (Schlecht)	Young leaves		89.3	2.5	...	0.6	6.3	0.9	1.3	11	67	2.9	4,860	...	0.04	0.69	1.2	36
Rhubarb, wild	*Polygonum alaskanum* (Small) Wight	Leaves		85.5	4.2	...	0.5	9.9	...	0.9	...	87	...	4,480	...	0.10	0.13	0.1	33
Salmon, king	*Oncorhynchus tschawytsch* (Walbaum)	Flesh, air-dried	1	15.3	...	...	37.5	...	...	...	28	645	2.0	...	640	...	...	...	...
			2	...	...	...	...	...	...	3.0	...	662	...	...	...	0.15	0.82	17.5	...
		Liver		...	...	...	...	...	...	1.6	...	412	2.6	...	...	...	...	...	...
		Roe		54.2	29.2	...	12.4	2.9	0	1.5	...	390	...	...	...	0.14	0.36	0.4	...
Salmon, chum	*Oncorhynchus keta* (Walbaum)	Flesh		64.3	12.0	12.0	1.5	0	0	...	11	283	...	...	...	0.08	0.18	...	...
Salmon, silver (coho)	*Oncorhynchus kisutch* (Walbaum)	Flesh, air-dried		10.7	...	...	36.5	0	0	...	...	680	1.5	...	...	...	...	...	...
		Flesh, air-dried, preserved in seal oil		28.1	51.4	49.6	19.4	0	0	2.9	...	670	...	...	1,220	0.10	0.35	4.2	...
Salmon, "tipnuk"	*Oncorhynchus* sp.	Whole fish or various parts putrified in the ground		68.8	15.9	...	10.6	2.7	0	2.0	...	467	...	...	780	0.13	0.15	1.9	...
Cloudberry (Salmonberry)	*Rubus chamaemorus* L.	Berries		86.7	2.4	...	0.8	8.6	3.2	0.5	18	35	0.7	210	...	0.05	0.07	0.9	158
Scoter, white-winged	*Melanitta deglandi* (Bonaparte)	Flesh		78.6	...	20.2	0.4	0	0	0.8	8	164	...	...	280	...	...	...	...
Seal, ringed	*Pusa hispida* (Schreber)	Flesh		67.4	...	28.4	3.2	0	0	1.0	5	238	19.6	...	1,050	0.14	0.53	...	...
		Liver		74.2	18.6	...	3.3	2.9	0	1.0	13	279	13.5	...	36,600	0.18	...	...	...
		Oil	1	...	...	...	...	...	...	...	...	...	...	...	11,300	...	...	...	...
			2	...	...	...	...	...	...	...	...	...	...	...	8,230	...	...	...	...
			3	...	...	...	...	...	...	...	...	...	...	...	3,010	...	...	...	...

Stonecrop	*Seduum rosea*(*L.*)Scop.	Young leaves	91.5	1.2	....	1.0	6.0	0.7	0.3	1	20	0.6	6,250	....	0.03	0.34	0.8	79
Smelt	*Osmerus dentex* (Steindachner)	Flesh and small bones	77.5	16.7	16.3	5.1	0	0	1.1	74	208	0.6	....	460	....	0.13	1.5	....
Smelt, rainbow	*Hypomesus olidus* (Pallas)	Flesh, air-dried	18.4	....	59.3	11.9	0	0	....	....	....	....	....	F	0.01	....	1.0	....
Squirrel, ground	*Citellus undulatus* (Pallas)	Flesh	75.4	19.3	20.2	3.8	0	0	0.6	....	175	4.7	....	220	....	....	....	....
		Flesh, air-dried	24.7	34.2	36.7	33.1	0	0	5.5	....	404	....	....	F	....	....	....	....
Sourdock	*Rumex articus* (Trautv.)	Young leaves	89.7	2.3	....	0.7	6.5	1.1	0.8	2	55	0.8	11,900	....	0.09	0.54	1.1	68
Tom cod	*Eleginus gracilis* (Tilesius)	Flesh 1	79.2	14.7	....	0.8	....	....	....	....	....	0.4	....	....	....	....	....	....
		2	....	....	....	....	....	....	....	....	....	0.6	....	....	0.14	0.13	2.2	....
		Flesh, air-dried	27.2	64.3	....	2.0	....	....	....	....	....	....	....	....	....	....	....	....
		Liver	44.2	8.0	....	45.1	1.9	0	0.7	6	203	3.8	....	11,000	0.09	0.48	6.2	....
Trout, Dolly Varden	*Salvelinus malma* (Walbaum)	Flesh	78.6	15.9	16.3	2.1	0	0	....	....	....	....	....	1,160	0.02	0.42	....	....
Grayling	*Thymallus arcticus* (Richardson)	Flesh	76.8	20.7	20.2	2.0	0	0	1.0	....	260	....	....	600	0.01	....	1.3	....
Walrus	*Odobenus rosmarus divergens* Illiger	Flesh	....	....	....	....	....	....	....	....	....	....	....	170	....	0.24	4.8	....
		Flesh & subcutaneous fat	58.9	16.3	16.3	24.7	0	0	0.7	....	125	9.4	....	550	0.08	0.32	....	....
		Flesh, air-dried	38.8	57.0	57.0	2.6	0	0	1.6	....	415	43.0	....	410	0.21	0.79	10.1	....
		Liver	71.5	21.0	....	3.0	3.5	0	1.0	....	288	14.4	....	81,200	0.08	1.91	....	....
		Oil	....	....	....	....	....	....	....	....	....	....	....	2,600	....	....	....	....
Whale, Baleen Bowhead, Right	*Balaena mysticetus* L.	Flesh	70.9	26.2	25.8	2.6	0	0	0.7	....	213	14.1	....	330	0.19	0.79	7.4	....
		"Blubber", subcutaneous fat	2.9	0.4	0.4	96.5	....	....	0.1	0	5	0.5	....	....	....	....	....	....
		"Muktuk", skin and subcutaneous fat	32.9	12.6	....	53.0	1.2	0	0.3	5	87	....	....	750	0.08	0.02	0.8	....
		Oil	....	....	....	....	....	....	....	....	....	....	....	2,810	....	....	....	....
Whitefish	*Coregonus nasus* (Pallas)	Flesh	71.0	12.2	12.3	15.3	....	....	1.4	....	257	0.2	....	540	0.11	0.13	....	....
		Flesh, air-dried	....	....	....	....	....	....	....	65	844	0.9	....	730	....	0.14	10.3	....
		"Head", eyes, cheeks and soft bones	76.3	18.6	19.1	3.6	....	....	1.0	....	242	3.9	....	....	....	....	....	....
		Liver	76.1	....	....	....	....	....	1.3	....	207	8.6	....	1,510	0.18	0.54	2.7	....
		Roe	....	....	....	....	....	....	1.3	....	312	0.9	....	490	0.15	....	1.4	....
Whitefish	*Coregonus lavaretus nelsoni* Bean	Flesh	69.1	15.7	15.9	14.2	....	....	1.4	....	302	....	....	....	0.15	0.12	....	....
Willow	Salix pulchra Cham.	Young leaves	68.7	6.1	....	1.6	20.7	1.1	....	130	126	2.6	18,700	....	....	....	2.3	190
		Young leaves preserved in seal oil	27.6	2.6	....	61.0	8.1	....	0.6	....	88	1.3	....	....	....	....	....	....

Footnotes:

(1) **Vitamin A—Samples marked 'F' gave distinctly abnormal colors with the Carr-Price reagent.**

(2) Ascorbic **Acid—All meat samples,** including dried meats, **gave a** value for "ascorbic acid" by the **Roe and Kuether** method. **The** dinitrophenylhydrazone **thus** prepared **showed no indication of maximum** absorption at 520μ.

SOURCE OF ELEVEN SPECIFIC NUTRIENTS
IN
ALASKAN ESKIMO AND INDIAN DIETS
By Age and Sex

TABLE A-1.—SOURCE OF CALORIES: ADULT MALE AND FEMALE DIETS *
All Areas and Villages, All Seasons

Food Groups	All Foods		Local Foods		Imported Food		Mixed Food	
	M	F	M	F	M	F	M	F
Dairy	60	61	.....	.....	60	61	.....	.....
Egg	13	10	6	6	7	4	.....	.....
Meat	428	358	363	300	17	16	48	42
Fish	628	511	618	500	1	2	9	9
Fats	239	191	153	121	86	70	.....	.....
Fruits	96	91	8	7	34	34	54	50
Vegetables	28	28	12	11	16	17	.....	.....
Grains	868	739	.....	.....	868	739	.....	.....
Sugar	228	169	.....	.....	228	169	.....	.....
Miscellaneous	10	9	.....	.....	10	9	.....	.....
Mean Daily Intake	2598	2167	1160	945	1327	1121	111	101

* 858 records for males, 1067 for females.

TABLE A-2.—SOURCE OF CALORIES: MALES AND FEMALES 13–19 YEARS OF AGE *
All Areas and Villages, All Seasons

Food Groups	All Foods		Local Foods		Imported Food		Schoo' Lunch		Mixed Food	
	M	F	M	F	M	F	M	F	M	F
Dairy	170	143	....	....	128	107	42	36	....	....
Egg	20	17	9	8	6	5	5	4	....	....
Meat	285	239	229	191	13	13	3	2	40	33
Fish	430	361	420	351	1	2	....	....	9	8
Fats	167	139	76	63	81	68	10	8	....	....
Fruits	117	95	8	6	41	34	17	14	51	41
Vegetables	55	46	14	12	20	16	21	18	....	....
Grains	972	812	....	....	951	794	21	18	....	....
Sugar	152	125	....	....	152	125	....	....	....	....
Miscellaneous	18	15	....	....	11	9	7	6	....	....
Mean Daily Intake	2386	1992	756	631	1404	1173	126	106	100	82

* 303 records for males, 298 for females.

TABLE A-3.—SOURCE OF CALORIES: CHILDREN 7–12 YEARS AND 2–6 YEARS *
All Areas and Villages, All Seasons

Food Group	All Foods		Local Foods		Imported Food		School Lunch		Mixed Food Preparation	
	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6
Dairy	167	219	...	...	102	218	65	1		
Egg	16	8	5	3	4	5	7	...	...	...
Meat	222	203	175	158	12	13	4	...	31	32
Fish	330	249	321	243	2	1	...	...	7	5
Fats	138	83	58	33	65	50	15	...	...	...
Fruits	101	63	8	6	30	30	25	1	38	26
Vegetables	60	19	11	7	16	12	33	...	...	...
Grains	793	654	...	...	761	651	32	3	...	...
Sugar	121	90	...	...	121	90	...	...	...	...
Miscellaneous	18	8	...	...	8	8	10	...	...	...
Mean Daily Intake	1966	1596	578	450	1121	1078	191	5	76	63

* 916 records for children 7–12 and 843 for children 2–6 years old.

TABLE B-1.—PERCENT CALORIES FROM PROTEIN: MALES AND FEMALES 17–70 YEARS OF AGE
All Seasons, By Village

Village	Percent Calories From Protein													
	17 Yrs.		20 Yrs.		30 Yrs.		40 Yrs.		50 Yrs.		60 Yrs.		70 Yrs.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
N. Central Athapascan														
Allakaket	29	22	21	28	31	28	35	31	30	25	25	33	38	29
Huslia	22	17	24	24	27	23	25	25	21	19	20	27	21	23
Northern Eskimo														
Noatak	36	29	28	33	35	36	32	38	32	28	31	37	37	......
Point Hope	......	24	21	24	29	22	25	26	23	20	23	23	25	15
Shishmaref	38	......	28	32	29	28	32	33	29	39	38	31	27	29
Shungnak	46	22	42	39	38	37	44	46	45	32	28	35	41	30
Southwestern Eskimo														
Akiak	28	23	27	26	24	27	26	33	28	30	39	......	25	38
Hooper Bay	34	24	31	29	32	32	31	27	28	34	32	......	35	30
Napaskiak	41	26	26	28	28	29	30	35	35	31	26	34	35	26
Newtok	......	30	28	29	28	30	32	28	31	29	......	......	......	......
Kasigluk	18	51	40	38	39	42	39	40	50	....	43	65	37	......
All Areas, Villages Combined	32	26	29	30	31	30	32	32	32	29	31	31	32	33

TABLE B-2.—SOURCE OF PROTEIN: ADULT MALES AND FEMALES *

All Areas and Villages, All Seasons

In Grams

Food Group	All Foods		Local Foods		Imported Food		Mixed Food Preparations	
	M	F	M	F	M	F	M	F
Dairy	3.0	3.1	......	......	3.0	3.1	......	......
Egg	0.8	0.7	0.3	0.4	0.5	0.3	......	......
Meat	72.1	62.6	65.9	56.5	0.7	0.9	5.5	5.2
Fish	104.7	86.7	103.3	85.3	......	......	1.4	1.4
Fats	0.4	0.5	......	......	0.4	0.5	......	......
Fruits	0.8	0.7	0.2	0.1	0.3	0.3	0.3	0.3
Vegetables	1.2	1.0	0.3	0.3	0.9	0.7	......	......
Grains	15.7	14.0	......	......	15.7	14.0	......	......
Miscellaneous	0.4	0.3	......	......	0.4	0.3	......	......
Mean Daily Intake	199.1	169.6	170.0	142.6	21.9	20.1	7.2	6.9

* 858 records for males, 1067 for females.

TABLE B-3.—SOURCE OF PROTEIN: MALES AND FEMALES 13–19 YEARS OF AGE *
All Areas and Villages, All Seasons
In Grams

Food Group	All Foods		Local Food		Imported Food		School Lunch		Mixed Food Preparation	
	M	F	M	F	M	F	M	F	M	F
Dairy	11.5	9.7	....	....	7.0	5.9	4.5	3.8	....	....
Egg	1.5	1.2	0.7	0.6	0.3	0.2	0.5	0.4	....	....
Meat	51.0	43.0	44.3	37.4	1.0	0.8	0.5	0.4	5.2	4.4
Fish	71.9	60.4	70.4	59.1	0.1	0.1	....	....	1.4	1.2
Fats	0.6	0.5	....	....	0.4	0.3	0.2	0.2	....	....
Fruits	1.1	1.0	0.2	0.2	0.3	0.3	0.2	0.2	0.4	0.3
Vegetables	3.7	3.1	0.4	0.4	0.9	0.7	2.4	2.0	....	....
Grains	19.4	16.3	....	....	18.6	15.6	0.8	0.7	....	....
Sugar	0.2	0.1	....	....	0.2	0.1	....	....	....	....
Miscellaneous	1.0	0.8	....	....	0.5	0.4	0.5	0.4	....	....
Mean Daily Intake	161.9	136.1	116.0	97.7	29.3	24.4	9.6	8.1	7.0	5.9

* 308 records for males, 298 for females.

TABLE B-4.—SOURCE OF PROTEIN: CHILDREN 7–12 AND 2–6 YEARS OF AGE *
All Areas and Villages, All Seasons
In Grams

Food Group	All Foods		Local Foods		Imported Foods		School Lunch		Mixed Preparations	
	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6
Dairy	8.5	10.8			5.0	10.8	3.5	INCLUDED UNDER IMPORTED FOODS		
Egg	1.1	0.5	0.5	0.3	0.2	0.2	0.4			
Meat	37.9	30.5	32.8	25.8	0.8	0.8	0.4		3.9	3.9
Fish	53.4	39.0	52.1	38.0	0.2	0.1			1.1	0.9
Fats	0.5	0.2			0.4	0.2	0.1			
Fruits	0.8	0.5	0.2	0.1	0.2	0.3	0.2		0.2	0.1
Vegetables	2.8	0.7	0.3	0.2	0.6	0.5	1.9			
Grains	14.4	11.8			13.7	11.8	0.7			
Sugars	0.1	0.2			0.1	0.2				
Miscellaneous	0.7	0.3			0.4	0.3	0.3			
Mean Daily Intake	120.2	94.5	85.9	64.4	21.6	25.2	7.5		5.2	4.9

* 916 records for 7–12 and 843 for 2–6 year olds.

TABLE C–1.—PERCENT CALORIES FROM FAT: MALES AND FEMALES
17–70 Years of Age, All Seasons
By Village

Village and Area	Percent Calories From Fat													
	17 Yrs.		20 Yrs.		30 Yrs.		40 Yrs.		50 Yrs.		60 Yrs.		70 Yrs.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
N. Central Athapascan														
Allakaket	26	30	31	32	27	28	24	24	24	37	33	26	26	29
Huslia	34	34	30	32	29	30	32	30	31	29	52	25	32	29
Northern Eskimo														
Noatak	28	35	37	35	34	33	36	32	38	37	35	32	34	......
Point Hope	......	34	40	41	43	35	41	36	42	38	37	40	30	34
Shishmaref	30	......	37	38	39	39	39	33	33	38	43	40	47	37
Shungnak	31	42	29	32	33	36	31	32	32	39	40	35	35	43
Southwestern Eskimo														
Akiak	39	44	45	41	40	47	45	41	44	42	44	......	41	30
Hooper Bay	38	42	39	39	37	37	36	37	45	39	47	......	32	39
Napaskiak	29	39	38	37	37	42	36	35	35	34	43	37	35	46
Newtok	......	48	49	47	48	49	47	50	47	44	......	......	......	......
Kasigluk	48	27	31	33	31	29	31	34	30	......	28	......	35	20
All Villages Combined	34	38	37	38	36	37	36	35	36	38	39	34	35	34

TABLE C-2.—SOURCE OF FAT: ADULT MALES AND FEMALES *
All Areas and Villages, All Seasons
In Grams

Food Group	All Foods		Local Foods		Imported Food		Mixed Food Preparations	
	M	F	M	F	M	F	M	F
Dairy	3.4	3.3	......	......	3.4	3.3	......	......
Egg	1.0	0.9	0.4	0.5	0.6	0.4	......	......
Meat	12.8	10.4	10.0	8.0	1.2	1.1	1.6	1.3
Fish	19.4	15.7	19.2	15.4	......	0.1	0.2	0.2
Fats	26.8	21.2	17.2	13.6	9.6	7.6	......	......
Fruits	4.9	4.7	0.1	0.1	......	0.2	4.8	4.4
Vegetables	0.9	0.9	0.4	0.5	0.5	0.4	......	......
Grains	38.6	32.3	......	......	38.6	32.3	......	......
Sugar	0.1	0.2	......	......	0.1	0.2	......	......
Miscellaneous	0.2	0.1	......	......	0.2	0.1	......	......
Mean Daily Intake	108.1	89.7	47.3	38.1	54.2	45.7	6.6	5.9

* 858 records for males, 1067 for females.

TABLE C-3.—SOURCE OF FAT: MALES AND FEMALES 13–19 YEARS OF AGE *
All Areas and Villages, All Seasons
In Grams

Food Group	All Foods		Local Foods		Imported Foods		School Lunch		Mixed Foods	
	M	F	M	F	M	F	M	F	M	F
Dairy	10.2	8.9	....	....	6.4	5.7	3.8	3.2	....	....
Egg	1.6	1.4	0.6	0.6	0.4	0.3	0.6	0.5	....	....
Meat	8.1	7.2	5.8	5.2	1.0	0.9	0.3	0.2	1.0	0.9
Fish	12.3	11.0	12.0	10.8	0.1	....	....	....	0.2	0.2
Fats	17.5	15.6	7.4	6.7	8.3	7.4	1.8	1.5	....	....
Fruits	4.2	3.8	0.1	0.1	0.1	0.1	0.1	0.1	3.9	3.5
Vegetables	1.2	1.1	0.5	0.4	0.4	0.4	0.3	0.3	....	....
Grains	39.2	34.9	....	....	38.2	34.1	1.0	0.8	....	....
Sugar	0.4	0.4	....	....	0.4	0.4	....	....	....	....
Miscellaneous	0.6	0.5	....	....	0.4	0.2	0.2	0.3	....	....
Mean Daily Intake	95.3	84.8	26.4	23.8	55.7	49.5	8.1	6.9	5.1	4.6

* 303 records for males, 298 for females.

Table C-4.—SOURCE OF FAT: CHILDREN 7 TO 12 AND 2 TO 6 YEARS OF AGE *
All Areas and Villages, All Seasons
In Grams

Food Group	All Foods		Local Food		Imported Food		School Lunch		Mixed Food Preparations	
	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6
Dairy	8.8	11.5	......	......	5.5	11.5	3.3	0.03	......	......
Egg	1.4	0.5	0.5	0.2	0.3	0.3	0.6	......	......	......
Meat	6.9	7.2	4.9	5.4	0.9	0.8	0.3	......	0.8	1.0
Fish	10.6	7.7	10.3	7.6	0.1	......	......	......	0.2	0.1
Fats	15.0	8.7	6.4	3.5	7.1	5.2	1.5	0.01	......	......
Fruits	3.5	2.4	0.1	0.1	......	0.1	0.1	......	3.3	2.2
Vegetables	1.1	0.5	0.4	0.2	0.4	0.3	0.3	......	......	......
Grains	33.3	27.2	......	......	32.5	27.1	0.8	0.06	......	......
Sugar	0.4	0.5	......	......	0.4	0.5	......	......	......	......
Miscellaneous	0.4	0.3	......	......	0.2	0.3	0.2	......	......	......
Mean Daily Intake	81.4	66.5	22.6	17.0	47.4	46.1	7.1	0.1	4.3	3.3

* 916 records for 7-12 and 843 for 2-6 year olds.

TABLE D-1.—PERCENT CALORIES FROM CARBOHYDRATE: MALES AND FEMALES 17–70 YEARS OF AGE

All Seasons, By Village

Village and Area	Percent Calories From Carbohydrate													
	17 Yrs.		20 Yrs.		30 Yrs.		40 Yrs.		50 Yrs.		60 Yrs.		70 Yrs.	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
N. Central Athapascan														
Allakaket	45	48	48	40	42	44	41	45	46	38	42	41	36	42
Huslia	44	49	46	44	44	47	43	45	48	52	30	48	47	48
Northern Eskimo														
Noatak	36	36	35	32	31	31	32	30	30	35	34	31	29	......
Point Hope	......	42	39	35	28	43	34	38	35	42	40	37	45	51
Shishmaref	32	......	35	30	32	33	29	34	38	23	19	29	26	34
Shungnak	23	36	29	29	29	27	25	22	23	29	32	30	24	27
Southwestern Eskimo														
Akiak	33	33	28	33	36	26	29	26	28	28	17	......	34	32
Hooper Bay	28	34	30	32	31	31	33	36	27	27	21	......	33	31
Napaskiak	30	35	36	35	35	29	34	30	30	35	31	29	30	28
Newtok	......	22	23	24	24	21	21	22	22	27	......	......	......	......
Kasigluk	34	22	29	29	30	29	30	26	20	......	29	......	28	15
All Villages Combined	34	36	34	32	33	33	32	33	32	33	30	35	33	33

TABLE D-2.—SOURCE OF CARBOHYDRATE: ADULT MALES AND FEMALES *

All Areas and Villages, All Seasons
In Grams

Food Group	All Foods		Local Food		Imported Food		Mixed Food Preparations	
	M	F	M	F	M	F	M	F
Dairy	4.5	4.4	......	......	4.5	4.4	......	......
Egg	......	......	......	......	......	......	......	......
Meat	2.8	2.7	0.2	0.2	0.6	0.6	2.0	1.9
Fish	1.0	0.8	0.3	0.2	0.1	0.1	0.6	0.5
Fats	0.2	0.2	......	......	0.2	0.2	......	......
Fruits	13.9	13.0	2.1	1.5	9.1	9 0	2.7	2.5
Vegetables	4.3	3.7	1.3	1.2	3.0	2.5	......	......
Grains	117.4	99.7	......	......	117.4	99.7	......	......
Sugar	58.9	43.3	......	......	58.9	43.3	......	......
Miscellaneous	1.6	1.4	......	......	1.6	1.4	......	......
Mean Daily Intake	204.6	169.2	3.9	3.1	195.4	161.2	5.3	4.9

* 858 records for males and 1067 for females.

TABLE D-3.—SOURCE OF CARBOHYDRATES: MALES AND FEMALES 13–19 YEARS OF AGE
All Areas and Villages,* All Seasons
In Grams

Food Group	All Foods		Local Food		Imported Food		School Lunch		Mixed Food Preparations	
	M	F	M	F	M	F	M	F	M	F
Dairy	15.2	11.7	....	....	9.5	7.5	5.7	4.2		
Egg	0.2	0.2	0.1	0.1	....	0.1	0.1	....	....	....
Meat	2.0	1.6	0.1	0.1	0.3	0.3	....	....	1.6	1.2
Fish	0.7	0.5	0.1	0.1	0.2	0.1	....	....	0.4	0.3
Fats	0.2	0.2	....	....	0.1	0.1	0.1	0.1	....	....
Fruits	22.3	17.2	1.4	1.0	10.6	8.0	7.8	5.7	2.5	2.5
Vegetables	11.6	9.0	1.6	1.2	3.2	2.8	6.8	5.0	....	....
Grains	130.3	101.0	....	....	123.6	96.2	6.7	4.8	....	....
Sugar	36.5	28.1	....	....	36.5	28.1	....	....	....	....
Miscellaneous	3.8	2.9	....	....	1.7	1.3	2.1	1.6	....	....
Mean Daily Intake	222.8	172.4	3.3	2.5	185.7	144.5	29.3	21.4	4.5	4.0

* 303 records for males and 298 for females.

TABLE D-4.—SOURCE OF CARBOHYDRATES: CHILDREN 7–12 AND 2–6 YEARS OF AGE *
All Areas and Villages, All Seasons
In Grams

Food Group	All Foods		Local Foods		Imported Food		School Lunch		Mixed Foods	
	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6
Dairy	13.2	16.2	...	...	8.1	16.2	5.1	INCLUDED UNDER IMPORTED FOODS	...	...
Egg	0.2	...	...	...	...	...	0.1		...	...
Meat	1.7	2.2	0.1	0.1	0.2	0.6			1.4	1.5
Fish	0.6	0.5	0.1	0.1	0.1	0.1	...		0.4	0.3
Fats	0.2	0.1	...	...	0.1	0.1	0.1		...	...
Fruits	19.4	11.0	1.1	1.4	9.4	8.2	6.9		2.0	1.4
Vegetables	10.1	2.8	1.3	0.8	2.8	2.0	6.0		...	...
Grains	113.6	90.1	...	...	107.7	90.1	5.9		...	...
Sugar	31.7	22.4	...	...	31.7	22.4	...		...	...
Miscellaneous	3.2	1.1	...	...	1.4	1.1	1.9		...	...
Mean Daily Intake	193.9	146.4	2.6	2.4	161.5	140.8	26.0		3.8	3.2

* 916 records for children 7–12 and 843 for 2–6 year olds.

TABLE E-1.—CALCIUM INTAKES OF ESKIMO AND INDIAN CHILDREN 2–5 YEARS OF AGE
By Area and Age Level

Geographic Area	2 Years of Age				3-5 Years of Age			
	No. of Records	Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC	No. of Records	Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC
Southwestern Eskimo	89	694	146–1478	81	258	577	82–2247	89
Northern Eskimo	42	739	183–1482	76	155	637	171–1616	89
Northcentral Athapascan	18	853	558–1471	61	84	643	204–1407	78
All Areas Combined	149	726	146–1482	75	497	603	82–2247	87

TABLE E-2.—COMPARISON: SOURCE OF CALCIUM: 368 ADULT FEMALE DIETS
At Hooper Bay and Point Hope, All Seasons
In Milligrams

Village	Number of Records	Mean Calcium Intakes by Source			
		All Food Sources	Local Foods	Import Food	Mixed Foods
Hooper Bay (Southwest Eskimo)	265	500	142	353	5
Point Hope (Northern Eskimo)	103	481	49	428	4

TABLE E-3.—SOURCE OF CALCIUM: ADULT MALE AND FEMALE DIETS *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Foods		Imported Food		Mixed Foods	
	M	F	M	F	M	F	M	F
Dairy	108	107	......	......	108	107	......	......
Egg	3	3	2	2	1	1	......	......
Meat	31	27	27	23	......	1	4	3
Fish	140	105	135	100	3	3	2	2
Fats	2	2	......	......	2	2	......	......
Fruits	10	9	3	2	5	5	2	2
Vegetables	7	8	1	1	6	7	......	......
Grain Products	252	215	......	......	252	215	......	......
Sugar Products	3	3	......	......	3	3	......	......
Miscellaneous	0	2	......	......	0	2	......	......
Mean Daily Intake	556	481	168	128	380	346	8	7

* 858 records for males and 1067 for females.

TABLE E–4.—SOURCE OF CALCIUM: MALES AND FEMALES 13–19 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Foods		Imported Foods		School Lunch		Mixed Foods	
	M	F	M	F	M	F	M	F	M	F
Dairy	310	273			187	166	123	107		
Egg	6	5	2	2	1	1	3	2		
Meat	18	14	14	12	1				3	2
Fish	59	54	55	51	2	2			2	1
Fats	2	3			2	2		1		
Fruits	12	10	2	1	5	5	4	3	1	1
Vegetables	17	15	1	1	5	4	11	10		
Grains	226	198			221	193	5	5		
Sugar	5	4			5	4				
Miscellaneous	5	4			2	2	3	2		
Mean Daily Intake	660	580	74	67	431	379	149	130	6	4

* 303 records for males and 293 for females.

Table E–5.—SOURCE OF CALCIUM: CHILDREN 7–12 AND 2–6 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Foods		Imported Food		School Lunch		Mixed Food Preparations	
	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6
Dairy	321	384	....	....	192	384	129	INCLUDED UNDER IMPORTED FOODS	....	....
Egg	7	3	3	1	1	2	3		....	....
Meat	18	15	14	14	1	....	....		3	1
Fish	61	37	57	[illegible]	3	....	....		1	4
Fats	2	1	....	....	2	1	....		....	....
Fruits	12	7	2	1	5	6	4		1	....
Vegetables	18	4	1	1	5	3	12		....	....
Grains	235	185	....	....	229	185	6		....	....
Sugar	8	4	....	....	5	4	3		....	....
Miscellaneous	2	1	....	....	2	1	....		....	....
Mean Daily Intake	684	641	77	50	445	586	157		5	5

* 916 records for 7–12 and 843 for 2–6 year olds.

TABLE F–1.—SOURCE OF IRON: ADULT MALE AND FEMALE DIETS *

All Areas and Villages, All Seasons

In Milligrams

Food Group	All Foods		Local Foods		Imported Food		Mixed Foods	
	M	F	M	F	M	F	M	F
Dairy	0.1	0.1	......	......	0.1	0.1	......	......
Egg	0.1	0.2	0.1	0.1	......	0.1	......	......
Meat	16.8	20.9	15.6	19.8	0.3	0.1	0.9	1.0
Fish	2.5	3.0	2.4	3.0	......	......	0.1	......
Fats	......	0.1	......	......	......	0.1	......	......
Fruits	0.3	0.4	0.1	0.1	0.2	0.3	......	......
Vegetables	0.3	0.3	0.1	0.1	0.2	0.2	......	......
Grains	3.7	4.9	......	......	3.7	4.9	......	......
Sugar	0.2	0.2	......	......	0.2	0.2	......	......
Miscellaneous	0.1	0.6	......	......	0.1	0.6**	......	......
Mean Daily Intake	24.1	30.7	18.3	23.1	4.8	6.6	1.0	1.0

* 858 records for males and 1067 for females.

** Includes 0.5 mg. iron from multiple vitamin preparations.

TABLE F-2.—SOURCE OF IRON: MALES AND FEMALES 13–19 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Groups	All Foods		Local Foods		Imported Food		School Lunch		Mixed Foods	
	M	F	M	F	M	F	M	F	M	F
Dairy	0.4	0.3	...	...	0.2	0.2	0.2	0.1	...	...
Egg	0.3	0.2	0.2	0.1	...	0.1	0.1	...	...	...
Meat	16.1	13.4	14.9	12.4	0.5	0.2	0.1	...	0.6	0.8
Fish	2.5	2.0	2.3	1.9	0.2	0.1	...	...	...	...
Fats	...	...	...	...	...	...	...	...	...	...
Fruits	0.8	0.7	0.1	0.1	0.4	0.3	0.3	0.2	...	0.1
Vegetables	1.3	1.1	0.1	0.1	0.3	0.2	0.9	0.8	...	...
Grains	6.9	5.7	...	...	6.7	5.5	0.2	0.2	...	...
Sugar	0.4	0.4	...	...	0.3	0.3	0.1	0.1	...	...
Miscellaneous	0.7	0.6	...	...	0.1	0.1	0.6**	0.5**	...	...
Mean Daily Intake	29.4	24.4	17.6	14.6	8.7	7.0	2.5	1.9	0.6	0.9

* 303 records for males and 298 for females.

** Includes 0.5 mg. from multiple vitamin preparations.

TABLE F-3.—SOURCE OF IRON: CHILDREN 7-12 AND 2-6 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Foods		Imported Food		School Lunch		Mixed Food	
	7-12	2-6	7-12	2-6	7-12	2-6	7-12	2-6***	7-12	2-6
Dairy	0.3	0.4	....	....	0.2	0.4	0.1		....	....
Egg	0.2	0.1	0.1	0.1	....	....	0.1		....	....
Meat	11.9	8.6	10.9	7.7	0.2	0.1	....		0.8	0.8
Fish	1.8	1.2	1.7	0.9	0.1	0.3	....		....	....
Fats	....	....	....	....	....	....	....		....	....
Fruits	0.6	0.3	0.1	....	0.2	0.2	0.3		....	0.1
Vegetables	1.0	0.2	0.1	0.1	0.1	0.1	0.8		....	....
Grains	5.1	4.2	....	....	4.9	4.2	0.2		....	....
Sugar	0.3	0.3	....	....	0.3	0.3	....		....	....
Miscellaneous	0.5	0.2	....	....	0.1	0.2**	0.4**		....	....
Mean Daily Intake	21.7	15.5	12.9	8.8	6.1	5.8	1.9		0.8	0.9

* 916 records for 7-12 and 843 for 2-6 year olds.
** Includes iron from multiple vitamin preparations.
*** Included under imported foods.

TABLE G–1.—SEASONAL FLUCTUATIONS IN MEAN DAILY VITAMIN A INTAKES
All Areas and Villages, By Age and Sex
In International Units

Age-Sex Category	Number of Records	Mean Daily Vitamin A Intake			
		Fall	Winter	Spring	Summer
Males 20+ Yrs	858	7590	6599	7346	4981
Females 20+ Yrs	1067	5439	6219	7527	3999
Males 13-19 Yrs	303	5631	8620	6445	3679
Females 13-19 Yrs	298	5450	8453	4879	2967
School Child 7-12 Yrs	916	5323	7821	4934	2950
Preschool Child 2-6 Yrs	843	4006	3882	4147	2799
Total Number Records	4285	933	2330	624	398
Percent Under NRC(4)	47.7	50.4	40.9	52.5	73.7

TABLE G-2.—VITAMIN A INTAKES: ALASKAN ESKIMO AND INDIAN CHILDREN 2–6 YEARS OF AGE

All Seasons, By Area and Age Level

Area	2-3 Years			4-5 Years			6 Years		
	No. of Records	Mean Daily Intake I.U.	Percent Under NRC	No. of Records	Mean Daily Intake I.U.	Percent Under NRC	No. of Records	Mean Daily Intake I.U.	Percent Under NRC
Northcentral Athapascan	44	3331	25	58	3075	45	31	3408	28
Northern Eskimo	86	3859	29	111	3475	39	48	7266	21
Southwestern Eskimo	187	1941	58	160	3636	57	118	4790	37

TABLE G–3.—SOURCE OF VITAMIN A: ADULT MALE AND FEMALE DIETS *

All Areas and Villages, All Seasons

In International Units

Food Group	All Foods		Local Foods		Imported Food		Mixed Foods	
	M	F	M	F	M	F	M	F
Dairy	162	163	......	......	162	163	......	......
Egg	88	78	43	46	45	32	......	......
Meat	2074	1734	1939	1615	30	36	105	83
Fish	2196	1770	2156	1725	1	5	39	40
Fats	966	760	716	578	250	182	......	......
Fruits	385	380	27	28	239	240	119	112
Vegetables	649	758	506	618	143	140	......	......
Grains	40	36	......	......	40	36	......	......
Sugar	......	......	......	......	......	......	......	......
Miscellaneous	196	338	......	......	196**	338**	......	......
Mean Daily Intake	6756	6017	5387	4610	1106	1172	263***	235***

* 858 records for males and 1067 for females.

** More than 2/3 from pharmaceutical preparations.

*** Mostly from local foods.

TABLE G-4.—SOURCE OF VITAMIN A: MALES AND FEMALES 13 TO 19 YEARS OF AGE*
All Areas and Villages, All Seasons
In International Units

Food Group	All Foods		Local Foods		Imported Food		School Lunch		Mixed Foods	
	M	F	M	F	M	F	M	F	M	F
Dairy	469	433	...	...	329	283	140	150	...	...
Egg	115	106	53	53	29	23	33	30	...	...
Meat	1067	984	931	941	25	21	...	...	111	22
Fish	1125	1037	1077	1027	1	1	...	...	47	9
Fats	555	512	276	276	222	184	57	52	...	...
Fruits	505	465	21	21	278	307	78	112	128	25
Vegetables	1002	922	379	379	142	116	481	427	...	...
Grains	58	53	...	...	52	48	6	5	...	...
Miscellaneous	2307	2075	...	...	185**	120**	2122***	1955***	...	...
Mean Daily Intake	7203	6587	2737	2697	1263	1103	2917	2731	286	56

* 303 records for males and 298 for females.

** Mostly from Vitamin preparations given at home.

*** Mostly from Vitamin preparations given at the school lunch.

TABLE G–5.—SOURCE OF VITAMIN A: CHILDREN 7 TO 12 AND 2 TO 6 YEARS OF AGE *
All Areas and Villages, All Seasons
In International Units

Food Group	All Foods		Local Food		Imported Food		School Lunch		Mixed Food Preparations	
	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6
Dairy	423	630			273	627	150	3		
Egg	106	53	51	28	25	25	30			
Meat	960	757	862	645	21	38			77	74
Fish	1015	814	981	789	1	1			33	24
Fats	500	332	264	175	183	156	53	1		
Fruits	451	282	20	22	231	189	111	7	89	64
Vegetables	905	452	364	308	118	137	423	7		
Grain	48	34			43	34	5			
Sugar										
Miscellaneous	2055	417			116**	374**	1939**	43**		
Mean Daily Intake	6463	3771	2542	1967	1011	1581	2711	61	199	162

*916 records for 7–12 and 843 for 2–6 year olds.

** Mostly from pharmaceutical preparations.

TABLE H-1.—THIAMINE INTAKES: CHILDREN 2 TO 6 YEARS OF AGE
By Area, By Age Level

Area	2–5 Years of Age				6 Years of Age			
	No. of Records	Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC	No. of Records	Mean Daily Intake (mg)	Intake Range (mg)	Percent Under NRC
Northcentral Athapascan	102	1.077	.347–5.075	34	31	1.096	.476–4.888	35
Northern Eskimo	197	1.071	.314–4.931	43	48	2.005	.586–3.603	15
Southwestern Eskimo	347	0.954	.058–3.986	43	118	1.903	.033–4.254	26
Totals	646	1.009	.058–5.075	42	197	1.801	.033–4.888	25

TABLE H-2.—SOURCE OF THIAMINE: ADULT MALE AND FEMALE DIETS *

All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Food		Imported Food		Mixed Food	
	M	F	M	F	M	F	M	F
Dairy	0.019	0.020	......	......	0.019	0.020	......	......
Egg	0.006	0.006	0.004	0.004	0.002	0.002	......	......
Meat	0.364	0.311	0.322	0.271	0.011	0.010	0.031	0.030
Fish	0.383	0.307	0.377	0.300	......	0.002	0.006	0.005
Fats	0.006	0.007	......	......	0.006	0.007	......	......
Fruits	0.032	0.030	0.005	0.005	0.010	0.010	0.017	0.015
Vegetables	0.021	0.018	0.008	0.008	0.013	0.010	......	......
Grains	0.643	0.543	......	......	0.643	0.543	......	......
Sugar	......	0.001	......	......	......	0.001	......	......
Miscellaneous	0.109	0.163	......	......	0.109**	0.163**	......	......
Mean Daily Intake	1.583	1.406	0.716	0.588	0.813	0.768	0.054	0.050

* 858 records for males and 1067 for females.

** About 2/3 from pharmaceutical preparations.

TABLE H-3.—SOURCE OF THIAMINE: MALES AND FEMALES 13–19 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Food		Imported Food		School Lunch		Mixed Food Preparations	
	M	F	M	F	M	F	M	F	M	F
Dairy	0.059	0.060	......	......	0.038	0.038	0.021	0.022	......	......
Egg	0.009	0.008	0.005	0.004	0.001	0.001	0.003	0.003	......	......
Meat	0.211	0.193	0.177	0.161	0.008	0.008	0.002	0.002	0.024	0.022
Fish	0.214	0.200	0.210	0.196	......	......	......	......	0.004	0.004
Fats	0.004	0.004	......	......	0.004	0.004	......	......	......	......
Fruits	0.038	0.036	0.004	0.004	0.011	0.010	0.009	0.009	0.014	0.013
Vegetables	0.046	0.046	0.008	0.008	0.011	0.010	0.027	0.028	......	......
Grains	0.635	0.598	......	......	0.616	0.579	0.019	0.019	......	......
Sugar	0.002	0.002	......	......	0.902	0.002	......	......	......	......
Miscellaneous	0.942	0.941	......	......	0.045**	0.045**	0.897**	0.896**	......	......
Mean Daily Intake	2.160	2.088	0.404	0.373	0.736	0.697	0.978	0.979	0.042***	0.039***

* 303 records for males and 298 for females.

** Mostly from pharmaceutical preparations.

*** Mostly from local foods.

TABLE H-4.—SOURCE OF THIAMINE: CHILDREN 7 TO 12 AND 2 TO 6 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Food		Imported Food		School Lunch		Mixed Food Preparations	
	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6
Dairy	0.059	0.086	...	...	0.036	0.086	0.023	...	...	...
Egg	0.008	0.004	0.004	0.002	0.001	0.002	0.003	...	...	...
Meat	0.193	0.185	0.159	0.150	0.008	0.009	0.003	...	0.023	0.026
Fish	0.199	0.168	0.194	0.163	0.001	0.001	...	...	0.004	0.004
Fats	0.004	0.002	...	...	0.003	0.002	0.001	...	...	...
Fruits	0.036	0.026	0.004	0.004	0.010	0.012	0.009	...	0.013	0.010
Vegetables	0.047	0.014	0.008	0.006	0.010	0.008	0.029	...	...	...
Grains	0.595	0.566	...	...	0.575	0.565	0.020	0.001	...	...
Sugar	0.002	0.001	...	...	0.002	0.001	...	...	...	...
Miscellaneous	0.997	0.158	...	...	0.045**	0.138**	0.952**	0.020**	...	...
Mean Daily Intake	2.140	1.210	0.369	0.325	0.691	0.824	1.040	0.021	0.040	0.040

* 916 records for 7–12 and 843 for 2–6 year olds.

** Mostly from pharmaceutical preparations.

TABLE I–1.—SOURCE OF RIBOFLAVIN: ADULT MALE AND FEMALE DIETS *

All Areas and Villages, All Seasons

In Milligrams

Food Group	All Foods		Local Food		Imported Food		Mixed Food Preparations	
	M	F	M	F	M	F	M	F
Dairy	0.149	0.147	......	......	0.149	0.147	......	......
Egg	0.018	0.017	0.008	0.010	0.010	0.007	......	......
Meat	1.242	1.057	1.133	0.945	0.008	0.012	0.101	0.100
Fish	0.952	0.752	0.944	0.741	......	0.002	0.008	0.009
Fats	0.003	0.005	......	......	0.003	0.005	......	......
Fruits	0.023	0.022	0.006	0.006	0.010	0.009	0.007	0.007
Vegetables	0.035	0.038	0.025	0.029	0.010	0.009	......	......
Grains	0.395	0.333	......	......	0.395	0.333	......	......
Sugar	0.003	0.002	......	......	0.003	0.002	......	......
Miscellaneous	0.108	0.168	......	......	0.108**	0.168**	......	......
Mean Daily Intake	2.928	2.541	2.116	1.731	0.696	0.694	0.116	0.116

* 858 records for males and 1067 for females.

** Approximately 3/4 from pharmaceutical preparations.

Table I-2.—SOURCE OF RIBOFLAVIN: MALES AND FEMALES 13–19 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Food		Imported Food		School Lunch		Mixed Food Preparations	
	M	F	M	F	M	F	M	F	M	F
Dairy	0.453	0.423	......	......	0.292	0.266	0.161	0.157	......	......
Egg	0.027	0.025	0.012	0.011	0.006	0.005	0.009	0.009	......	......
Meat	0.670	0.612	0.576	0.528	0.009	0.009	0.003	0.003	0.082	0.072
Fish	0.526	0.481	0.514	0.471	0.003	0.003	......	......	0.009	0.007
Fats	0.004	0.004	......	......	0.003	0.003	0.001	0.001	......	......
Fruits	0.033	0.031	0.007	0.006	0.012	0.010	0.008	0.008	0.006	0.007
Vegetables	0.052	0.050	0.021	0.020	0.009	0.009	0.022	0.021	......	......
Grain	0.391	0.355	......	......	0.378	0.343	0.013	0.012	......	......
Sugar	0.004	0.003	......	......	0.004	0.003	......	......	......	......
Miscellaneous	0.962	0.938	......	......	0.040**	0.036**	0.922**	0.902**	......	......
Mean Daily Intake	3.122	2.922	1.130	1.036	0.756	0.687	1.139	1.113	0.097	0.086

* 303 records for males and 298 for females.

** Mostly from pharmaceutical preparations.

TABLE I-3.—SOURCE OF RIBOFLAVIN: CHILDREN 7 TO 12 AND 2 TO 6 YEARS OF AGE *

All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Food		Imported Food		School Lunch		Mixed Food Preparations	
	7-12	2-6	7-12	2-6	7-12	2-6	7-12	2-6	7-12	2-6
Dairy	0.429	0.561	......	......	0.264	0.558	0.165	0.003		
Egg	0.026	0.011	0.012	0.006	0.005	0.005	0.009		......	......
Meat	0.614	0.528	0.528	0.461	0.009	......	0.004	......	......	......
Fish	0.482	0.333	0.472	0.327	0.003	......	......	......	0.073	0.067
Fats	0.004	0.002	......	......	0.003	0.002	0.001	......	0.007	0.006
Fruits	0.030	0.019	0.006	0.006	0.010	0.009	0.008	......	......	......
Vegetables	0.052	0.021	0.021	0.015	0.009	0.006	0.022	......	0.006	0.004
Grains	0.357	0.289	......	......	0.344	0.288	0.013	0.001	......	......
Sugar	0.003	0.004	......	......	0.003	0.004	......	......	......	......
Miscellaneous	0.985	0.146	......	......	0.040**	0.129**	0.945**	0.017**	......	......
Mean Daily Intake	2.982	1.914	1.039	0.815	0.690	1.001	1.167	0.021	0.086	0.077

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* 916 records for 7-12 and 843 for 2-6 year olds.

** Mostly from pharmaceutical preparations.

TABLE J-1.—SOURCE OF NIACIN: ADULT MALE AND FEMALE DIETS *

All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Food		Imported Food		Mixed Foods	
	M	F	M	F	M	F	M	F
Dairy	0.1	0.1	......	......	0.1	0.1	......	......
Egg	......	......	......	......	......	......	......	......
Meat	14.9	12.8	13.9	11.7	0.1	0.2	0.9	0.9
Fish	18.0	15.0	17.8	14.8	......	......	0.2	0.2
Fats	0.1	0.1	......	......	0.1	0.1	......	......
Fruits	0.4	0.3	0.1	0.1	0.2	0.1	0.1	0.1
Vegetables	0.3	0.3	0.1	0.1	0.2	0.2	......	......
Grains	5.7	4.9	......	......	5.7	4.9	......	......
Sugar	......	0.1	......	......	......	0.1	......	......
Miscellaneous	0.8	1.2	......	......	0.8**	1.2**	......	......
Mean Daily Intake	40.3	34.8	31.9	26.7	7.2	6.9	1.2	1.2

* 858 records for males and 1067 for females.

** Males, more than half and females 2/3 from pharmaceutical preparations.

TABLE J-2.—SOURCE OF NIACIN: MALES AND FEMALES 13 TO 19 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Food		Imported Food		School Lunch		Mixed Foods	
	M	F	M	F	M	F	M	F	M	F
Dairy	0.3	0.3	......	......	0.2	0.2	0.1	0.1	......	......
Egg	......	......	......	......	......	......	......	......	......	......
Meat	9.7	8.4	9.5	8.2	0.2	0.1	......	0.1	......	......
Fish	12.2	10.4	12.2	10.3	......	......	......	0.1	......	......
Fats	0.2	0.2	......	......	0.1	0.1	0.1	0.1	......	......
Fruits	0.3	0.5	......	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Vegetables	0.7	0.6	0.1	0.1	0.2	0.2	0.4	0.3	......	......
Grains	6.4	5.4	......	......	6.1	5.2	0.3	0.2	......	......
Sugar	0.1	0.1	......	......	0.1	0.1	......	......	......	......
Miscellaneous	7.5	6.7	......	......	0.4**	0.3**	7.1**	6.4**	......	......
Mean Daily Intake	37.4	32.6	21.8	18.7	7.4	6.3	8.1	7.4	0.1	0.2

* 303 records for males and 298 for females.

** Mostly from pharmaceutical preparations.

TABLE J–3.—SOURCE OF NIACIN: CHILDREN 7 TO 12 AND 2 TO 6 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Foods		Imported Food		School Lunch		Mixed Food Preparations	
	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6
Dairy	0.3	0.4			0.2	0.4	0.1			
Egg										
Meat	7.7	6.5	6.8	5.6	0.2	0.2	0.1		0.6	0.7
Fish	9.5	7.1	9.4	6.9	0.1					0.2
Fats	0.2				0.1		0.1			
Fruits	0.4	0.2	0.1		0.2	0.2	0.1			
Vegetables	0.6	0.2	0.1		0.1	0.2	0.3		0.1	
Grains	5.0	4.5			4.8	4.5	0.2			
Sugar	0.1	0.1			0.1	0.1				
Miscellaneous	6.3	1.1				0.1	6.3**	1.0**		
Mean Daily Intake	30.1	20.1	16.4	12.5	5.8	5.7	7.2	1.0**	0.7	0.9

* 916 records for 7–12 and 843 for 2–6 year olds.

** Mostly from pharmaceutical preparations given at school.

TABLE K–1.—SEASONAL VARIATIONS IN MEAN DAILY ASCORBIC ACID INTAKES
All Areas and Villages, By Age and Sex, By Season
In Milligrams

Age-Sex Category	Number of Records	Mean Daily Ascorbic Acid Intakes			
		Fall	Winter	Spring	Summer
Male 20-60 Yrs.	746	47	22	24	58
Male 60 + Yrs.	112	38	17	15	50
Male 13-19 Yrs.	303	60	48	25	45
Female 20-60 Yrs.	633	49	23	33	48
Pregnant Female	121	65	15	34	45
Lactating Female	193	41	20	19	55
Female 60 + Yrs.	120	20	20	11	43
Female 13-19 Yrs.	298	61	48	25	64
School Child 7-12 Yrs.	916	57	50	25	42
Preschool Child 4-6 Yrs.	526	52	29	20	55
Preschool Child 2-3 Yrs.	317	40	11	16	54
Total Records	4285	933	2330	624	398
Percent Under NRC(4)	82	71	86	89	79

TABLE K–2.—SOURCE OF ASCORBIC ACID: ADULT MALE AND FEMALE DIETS *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Foods		Imported Food		Mixed Foods	
	M	F	M	F	M	F	M	F
Dairy								
Egg								
Meat								
Fish	1						1	
Fats								
Fruits	21	22	12	10	3	5	6	7
Vegetables	5	5	4	5	1			
Grains								
Sugar								
Miscellaneous	2	3			2**	3**		
Mean Daily Intake	29	30	16	15	6	8	7	7

* 858 records for males, 1067 for females.

** From pharmaceutical preparations.

Table K–3.—SOURCE OF ASCORBIC ACID: MALES AND FEMALES 13 TO 19 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Foods		Imported Food		School Lunch		Mixed Foods	
	M	F	M	F	M	F	M	F	M	F
Dairy										
Egg										
Meat										
Fish										
Fats										
Fruits	22	25	9	11	4	4	3	3	6	7
Vegetables	6	6	3	3	1	1	2	2		
Grains										
Sugar										
Miscellaneous	19**	18**			2**	2**	17**	16**		
Mean Daily Intake	47	49	12	14	7	7	22	21	6	7

* 303 records for males and 298 for females.

** Mostly from pharmaceutical preparations.

TABLE K-4.—SOURCE OF ASCORBIC ACID: CHILDREN 7 TO 12 AND 2 TO 6 YEARS OF AGE *
All Areas and Villages, All Seasons
In Milligrams

Food Group	All Foods		Local Foods		Imported Food		School Lunch		Mixed Foods	
	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6	7–12	2–6
Dairy										
Egg										
Meat										
Fish										
Fats										
Fruits	21	21	8	11	4	2	3	3***	6	5
Vegetables	6	4	3	3	1	1	2			
Grains										
Miscellaneous	17	5				1	17**	4**		
Mean Daily Intake	44	30	11	14	5	4	22	7	6	5

* 916 records for 7–12 and 843 for 2–6 year olds.
** Mostly from pharmaceutical preparations given at school.
*** Mostly for 6 year olds attending school.

SOME PARTICULAR METHODS OF FOOD PREPARATION

CARIBOU PREPARATION TECHNIQUES

Caribou is an important food in the diet of many of Alaska's Northern Eskimos. Practically all parts of the animal are eaten. Some of the typical food preparation techniques are as follows:

A. CARIBOU STOMACH AND CONTENTS (partially digested vegetation including lichens such as reindeer moss).

1. The stomach and its contents may be frozen immediately after butchering and stored for future use. It is eaten frozen with seal oil.

2. Sometimes at butchering a small amount of the stomach contents are removed, just enough so that the stomach and its remaining contents can be easily handled. The stomach is then set in the snow and covered with caribou skins to prevent freezing. In about two to three days the stomach contents become sweet.

3. Two of the stomach parts, the rumen (knee-oo-kuk) and the omasum (muk-pee-rawk) are removed, cleaned thoroughly and boiled a short time. They are eaten with or without seal oil, as desired.

B. INTESTINES

1. The cleaned small intestines of the caribou are stuffed with strips of visceral fat obtained from around the stomach and intestines. The ends are tied and this "sausage" is then boiled a long time. The cooked fat may then be used as a spread or in any other way much as we do butter.

2. At the hunting camp the visceral fat strips may be placed in the cleaned small intestine but left uncooked. On returning home the strips are removed and hung up to dry, either indoors or outdoors. This fat is used in making *agutuk*.

3. The small intestines with the visceral fat left attached are cleaned, thoroughly washed and then cooked in water. The rendered fat is removed, the cooked intestines chopped into ¾" to 1" lengths and the two are thoroughly mixed together.

4. The cleaned small intestines with attached visceral fat are ground, chopped and pounded thoroughly, and then heated in water. The fat is removed as it is rendered. This fat is then

whipped, gradually mixed with seal oil, stirred until it becomes light and fluffy, and one or more of the following added: blueberries, crowberries, chopped cooked "mashu", raisins, pilot bread crumbs, cooked dried apples, cooked, chopped or ground caribou meat or cooked whitefish—squeezed dry and thoroughly flaked. Sugar may be added if fruits are used.

C. LIVER

1. Liver may be fried or it may be prepared as *Nay-ru-kuk* as follows: Short strips of liver and muscle tendon, particularly those found close to the sinews along the back and in the hind and forelegs, are mixed with the stomach contents, put into a cleaned caribou stomach, and then set aside in a warm, but not too hot, place for about a week. The mixture becomes sweet. If kept too long it gets too sweet.

D. EYES

The eyes, including the muscle and fat around them, are cooked until soft. Only the muscle and the fat are eaten.

E. BONE MARROW (*Pa-tik*)

1. Bone marrow may be eaten raw or cooked. Marrow differs in consistency depending on the location of the bone. The most solid part is found in the hip and upper thigh bone and is called *ki-nik-nik*. Less solid marrow is found in the lower thigh and upper part of the shank bones. This marrow is called *ah-noa-tuk-suk*. The marrow found in the lower part of the leg is oil-like in consistency and is called *peg-nick;* this is the most preferred.

2. In times past, but less frequently now, it was a common practice to break up the caribou bones, cover them with water and simmer to render out the fat. Both fat and marrow were then removed from the cooking pot and mixed thoroughly. This mixture was stored in a thoroughly cleaned and dried caribou stomach and then frozen. It was used as a spread or as a condiment with fish and meat. At Shungnak this mixture is called *poing-nik*.

F. KIDNEYS

The kidneys are not often eaten and when they are, they are preferred raw right after the animal is killed and the kidneys still "hot and steaming," at which time they are said to have a very spicy taste.

G. BLOOD

1. Blood is sometimes drunk raw from the freshly killed animal, but its most common use in aboriginal times was as a soup thickener. It had to be stirred carefully into the hot, but not boiling, liquid to prevent coagulation. Then thin slivers of caribou fat were added and stirred to make a creamy mixture or gravy.

2. Fresh caribou blood is sometimes stored in the thoroughly cleaned stomach part, the reticulum, and then frozen. This blood is used in soups or in the preparation of *azeesuk. Azeesuk* is made by chopping low-bush cranberries, adding caribou blood and stirring and whipping the mixture to a fluff.

3. Sometimes caribou back fat is dipped into blood and air dried. According to my informant, the fat inside never gets spoiled or yellow.

4. Caribou back fat is sometimes ground, and to it is added blood, flour, pepper, onion, and salt. This sausage mixture is stuffed into cleaned caribou intestines, the ends tied, and the whole cooked by boiling. This was learned from the Lapps who were brought over in the early days to help with the reindeer industry.

H. BRAINS

Brains are sometimes eaten raw, especially by the men at hunting camps; sometimes fried, sometimes cooked with tongue to make a stew or used to make *kah-kay-suk*. The latter is made by boiling the caribou brain along with the meat and fat from the jaws and around the eyes, and other parts of the head. The meat is separated out, mixed with the melted caribou fat and salted to taste.

I. CARIBOU *AGUTUK*

Caribou meat, preferably that along the sinews from the back and the hindquarters, is boiled and either chopped into very fine pieces or ground and added to a mixture of fats. Here is a typical Point Hope recipe:

1 cup caribou or edible beef tallow	4 pounds caribou meat, cooked and ground
1 cup seal or whale oil	1 cup caribou cooking broth

First, the tallow is thoroughly chopped or hammered; then softened by squeezing in the hands or by warming it slightly on the stove. It is then beaten or whipped to a fluff—using a circular motion of the hand. Seal or whale oil is then added gradually and after each small addition the mixture is whipped until it is light and fluffy. The lukewarm cooking broth is next added, again whipping and stirring thoroughly after each small addition. Lastly, the ground meat is stirred in thoroughly and the mixture set aside to cool. Caribou *agutuk* has a very pleasant delicate cheesy taste.

SEA MAMMALS: SEAL, UGRUK, BELUGA WHALE, BALEEN WHALE

Most of the meat from these common sea mammals is eaten either fresh, cooked or raw, frozen or dried. The greater share of the summer catch is air-dried.

Dried meat is usually eaten uncooked with seal oil, the rib meat especially being enjoyed in this way. Half-dried meat is usually cooked; thoroughly dried meat, only occasionally.

Specialty products include the following:

1. The *liver* from the smaller varieties of seal is especially relished. It is eaten either raw-frozen with seal oil or cooked, usually fried, or it may be "soured". This latter process involves placing the liver in a dish and then setting it aside in a cool place for about a month. When sufficiently soured, it is eaten raw with seal oil.

2. Well cleaned *seal stomachs* are sometimes eaten. On Diomede they are sometimes filled with walrus blubber and boiled(66).

3. *Seal kidneys* may be eaten either fresh, raw-frozen or diced and cooked with liver in seal oil.

4. *Seal heads* are boiled and all parts eaten.

5. The *seal intestines*, well cleaned, are often eaten as *kwak* (raw frozen). They may also be boiled in water or cooked in oil. They are sometimes dried and eaten either raw or cooked by boiling or frying. The cleaned, chopped ugruk intestines are sometimes mixed with berries. Seal oil may be added or not as desired.

6. *Infant seals,* and occasionally *embryo seals,* are a well-liked food. They are usually boiled, and then set aside to cool, before eating.

7. On Diomede, *seal lungs* are first inflated and then all the air is expressed out. They are then cut into strips and hung over the lamps or in other suitable places to dry. When dry, they may be eaten raw or cooked but always with seal oil.

8. *Seal oil* is considered by many Eskimos the best of the sea mammal blubber oils for eating purposes. The careful Eskimo housewife stores it in clean barrels or seal pokes in a cold place so that it stays light colored, free from dirt and other extraneous matter.

Seal oil is used to make "poke" fish or meat; it is used in making *agutuk* and other mixtures; it is used mostly as a condiment or dip for frozen and dried meats and fishes; it is occasionally used medicinally, sometimes taken by the tablespoon for colds or by the cupful as a cathartic.

9. *Seal and beluga flippers* are considered great delicacies by most of the coastal Eskimos. They are enjoyed fresh, raw. They may also be buried in grass-lined ground pits and allowed to sour or putrefy. The usual method is to line the sides and bottom of a 1½ to 2½ foot deep pit with grass sufficient to prevent the meat from making contact with the ground. The flippers are thoroughly rubbed with oil and laid in the pit. They are first well covered with plain blubber and then with a strip of blubber and meat from where the two meet on the carcass. This is then covered with grass, next with seal skin and then wood or dirt and left until the skin and hair from the flippers peels off easily.

Sometimes the clean flippers are laid in a clean ugruk skin (hair side on the outside), with plenty of blubber added and then the skin is folded over all. It is then placed in a grass-lined pit and covered to protect from the sun.

Eskimos emphasize that great care must be taken to protect the flippers from sun and heat both when butchering and during storage in the ground pit. Such care is especially important during a warm dry arctic summer. The pit site must be selected carefully, preferably where there is some shade. Eskimos report that buried flippers can cause fatal illness unless these precautions are taken.

Rabeau(67) has reported 13 cases of botulism with five fatalities in the Kotzebue area from the ingestion of improperly handled and stored flippers. Kotzebue Eskimos say flippers should be stored only in wooden containers, and even though stored in oil, must never be kept longer than a month. Some of the present day Kotzebue Eskimos have freezers and find this a satisfactory method of preservation.

The favorite Diomede way of preparing the *flippers, flukes,* and *head skin* of the *beluga whale,* which are considered the choice parts, is to place them in a dish in the upper part of the room, preferably above the oil lamp. In about a week they will be somewhat soured and a little more tender. They are then eaten raw with leaves of *kaghat* (*Polygonum bistorta*) if they are available. Meat is treated similarly. It is first cut into strips and sometimes meat juice added, preferably that drained from the fresh meat. When the product begins to bubble it is ready for eating. It is eaten raw more often than cooked(66).

Seal flippers are soured in the same manner. When the hair will slip off, the product is ready to eat raw.

10. *Beluga muktuk* consists of the outside skin of the beluga whale which is about ½" to ¾" thick with about ½" of attached blubber. It is considered a delicacy by the Eskimos who hunt this animal in the Kotzebue Sound. Long, three-to-four inch wide strips, deeply knife scored, are hung on racks and left to dry a day or two. They are then boiled a long time until the skin is soft. After removal from the cooking water, they are allowed to drain with the blubber side down, and again air-dried on racks for another day or two. In the meantime, the bulk of the blubber is heated in large containers to render the oil. The cooled oil is poured over the properly dried *muktuk*, completely covering it. The *muktuk* is then ready for either immediate eating or storage.

BALEEN WHALE

The baleen whale is caught more or less regularly at Barrow and Point Hope. Point Hope usually gets one to five animals each year. At Barrow the yearly catch varies from none to twenty or more.

Whale meat is never dried. That not immediately consumed is stored in special underground pits (at Barrow) or abandoned sod igloos (Point Hope) which remain cold the year round and therefore provide effective storage.

Whale meat is eaten mostly as *kwak* (raw-frozen), but it may also be cooked on occasion. Other parts of the animal cooked and used for human food include part of the *small intestine, the kidneys, the heart,* and *the muktuk* (outside skin with attached blubber). *Whale muktuk,* when fresh, is usually eaten boiled. When a little older, it is generally eaten raw, as the older skin is considered too tough to cook. Part of the blubber may also be used to obtain a clear oil. This is done by cutting the whale blubber into pieces, scoring it with a knife, and packing the blubber in a barrel and letting it stand. The oil, rendered by autolysis, is stored in a cold place.

Whale meat is sometimes made into a special dish called *mikiyuk,* a soured product. This product is made especially for "Nullikituk", the annual whale feast, held every June at both Barrow and Point Hope. Thinly cut slices of whale meat and pieces of whale *muktuk* are placed in clean barrels, pokes or other suitable containers and left in a slightly warm place for about a week. The mixture is stirred daily and the temperature of the surroundings watched carefully. If the meat is tender, it sours fairly fast; if tough, it is a slow process. The control of temperatures in the making of *mikiyuk*, without benefit of thermometer or automatic controls, requires considerable experience to prevent spoilage. When the meat reaches the desired stage, and experience is the only guide, *mikiyuk* can be eaten or frozen for future use.

WALRUS

At Point Hope and other arctic coastal villages where only a limited number of walrus are caught or where they are only available in certain years, the meat is generally eaten either raw, frozen (*kwak*) or boiled. The blubber is usually cooked and eaten with the cooked meat or skin. But on Diomede, St. Lawrence and King Islands and at Wales, where walrus is a much more important food, there are naturally many more methods of preparation. On St. Lawrence Island the meat of animals caught throughout the winter is eaten fresh cooked by boiling and is especially relished in combination with stored greens and fresh blubber oil. On Diomede Island(66) fresh walrus meat is generally well boiled, but that which has been "soured" during storage, is usually only half cooked. On all of these islands, and in the mainland villages, too, meat not immediately used is buried in ground pits where the temperature during such storage is variable depending on the time of year. During such storage, the meat often becomes "soured" or putrefied and may even become covered with mold. This is apparently no deterrent to its use as human food.

On both St. Lawrence and Diomede Islands the meat from walrus caught in May and June is cut into strips and air-dried. This dried meat is used throughout the summer, fall and early winter until walrus and seal hunting is again possible, usually in November. Old dried walrus meat is then stored in seal oil.

Other parts of the walrus used by residents of Diomede, St. Lawrence Island, and probably by other Eskimos too, include the following:

On St. Lawrence Island walrus skins not needed or desirable for boat covers are rolled into huge balls, sometimes weighing up to 100 pounds, and stored in caches as an emergency food in case the walrus catch during the winter is not sufficient to meet their food needs. If the skins are not needed as an emergency human food, they are eventually fed to the dogs.

Heinrich(66) reports that the Eskimos of Diomede Island commonly eat *walrus skin* fresh boiled throughout the season, but skin soured during storage is also relished and is eaten either raw, frozen or cooked.

On both Diomede and St. Lawrence Islands *walrus flippers* are sometimes eaten fresh, raw, unfrozen, but preferably after they have become somewhat soured during storage in the underground meat pits. Walrus flippers eaten with frozen stored greens are a winter favorite on Diomede Island.

According to Heinrich *walrus heads*, buried under a pile of rocks on the beach and left there until late summer to "ripen", are another Diomede delicacy. He says, "They are eaten with relish, brain and all."

Also on Diomede the *intestines* of the walrus are cleaned, filled with blubber and boiled to make a sausage. On St. Lawrence Island fresh tom cod roe is sometimes stored in cleaned walrus gut, frozen and later mixed with berries and eaten.

The *kidneys* of the walrus are soured and eaten raw.

Walrus heart is sometimes eaten fresh raw at butchering time, but it is usually boiled. On Diomede the thick heart arteries and veins are considered a special delicacy and eaten fresh raw.

Fresh *walrus liver* is often eaten raw-frozen with seal oil; sometimes fried or boiled; sometimes diced and cooked in seal oil; and sometimes soured, using either the same method as for seal liver, or as on Diomede Island, by first boiling medium sized pieces of liver and walrus flippers in two different pots, then packing them together in a barrel or poke, covering the mixture with the liver cooking water and then storing in the cold. This mixture is usually eaten the following fall or winter.

The *stomachs* of many freshly killed walrus are full of recently ingested clams in various stages of digestion. Such clams are highly relished by the Eskimo, and are eaten either raw, or put in a pan and hot water poured over them although they are not really cooked. Such clams are eaten plain and only occasionally with a small amount of oil.

Walrus milk, sour but not curdled, obtained from baby walrus stomachs was formerly used and highly prized.

BEARS

Polar bear are caught by Eskimos from St. Lawrence, King and Diomede Islands, and by those living along the coast north through the Bering Straits to the Arctic. Polar bear meat is never eaten as *kwak* (raw-frozen) but is always boiled. It is usually eaten with polar bear fat.

Occasionally black and grizzly bear are caught and used as food. Most experienced Eskimos cook the meat thoroughly before eating it.

The liver of the polar bear is never eaten by Eskimos. When asked why, they invariably reply, "It makes your hair fall out." Rodahl(68,69) reported that its toxicity is due to its extremely high vitamin A content.

WILDFOWL

Birds of various kinds are used by almost all native Alaska groups:—Eskimo, Aleut and Indian—for many areas in Alaska are either major breeding grounds, or else are located strategically on the migration flyways. Some of the most important food birds are ducks, geese, snowy owls, ptarmigan, spruce hens, cormorants, murres, puffins and auklets.

The usual method of cooking birds is by boiling. The cooking broth, usually with onion, salt, rice and/or macaroni added, is served as a soup. On St. Lawrence Island seaweed is added.

Many birds are stored for winter use. On St. Lawrence Island ducks, sea gulls, cormorants and auklets are dried before storage. An old method of preservation was to skin the birds and place them in a barrel or poke with seal oil, setting them aside for several months until they become "high" or soured. Heinrich(66) reports that on Diomede the breasts of birds, especially those from crested auklets, puffins and murres, are first dried, then cooked in oil or water, and stored in seal oil. Another Diomede practice he reports is that of tying the birds in burlap bags and storing them under the other meat in the underground meat pits. In winter they are dug out, plucked and boiled. They are generally eaten with seal oil. Occasionally birds are preserved by salting.

Bird Eggs: During June and July bird eggs are often harvested by the hundreds. Most are served fresh, boiled or scrambled. Occasionally, they are used in making cakes. Duck, goose, murre, cormorant and sea gull eggs are used in greatest abundance, but the people of the tundra villages may also eat the smaller bird eggs too. Bird eggs are used in all stages of incubation. The old method of preservation was to either cook first, or preferably leave uncooked, and store in seal oil.

Another old method of egg preservation practiced at Northeast Cape, St. Lawrence Island, was to dry the egg yolks on rocks in the sun, then put them in walrus stomachs and store in the cold.

Giddings(36) reports that in the Kobuk area bird eggs were preserved by burying them in a mixture of fine sand and gravel, and that they were cooked by placing them in a willow bark tube (peeled from a large willow), plugging the ends and laying it in a bed of coals.

CLAMS, CRABS, TUNICATES

At scattered points along the Alaska coast from the Arctic southward, a variety of other sea foods which are used by Alaskan native groups are available in variable amounts. Chief among these are clams, crabs, shrimp and tunicates. While these foods are rarely obtained in significant amounts, they are enjoyed seasonally.

1. *Crab.* At Point Hope a small hermit crab is caught and eaten, usually raw-frozen. They are left in the shell, set out on the ice to freeze, then the meat is cut out and squeezed to get rid of the salt. Only a few of the people cook crab, a method of preparation learned from Caucasians.

At Diomede, Nome and other Bering Sea points, the *King Crab* is hooked through the ice. It is a staple in the diet in late winter and early spring.

2. *Clams.* Partially digested clams obtained from the stomach of freshly caught walrus are considered a delicacy by the Eskimo who hunt this animal. Fay(70) has found several kinds of mollusks in walrus stomachs, the most abundant being *Clinocardium ciliatum, Hitella arctica* and *Mya* ssp.

On St. Lawrence Island clams, mussels and tunicates, washed up on the beach after fall storms are collected and used as food. They are only occasionally available in amounts sufficient to freeze for winter use. These are eaten raw or partially cooked.

Clams are also obtainable in limited quantities at Hooper Bay and other Bering Sea coastal villages.

FISH

Fish is the most important year-round food in the Yukon-Kuskokwim Eskimo diet. It is used seasonally, often in considerable quantities by all other Alaskan Eskimos, as well as by Indians and Aleuts. The fishes used in greatest abundance are blackfish, flounder, grayling, herring, ling cod, needlefish, pike, salmon (king, silver, dog and red), sculpin, smelts, tom cod, trout and whitefish. The individual importance of these fish in the Eskimo and Indian diet depends on the geographic location of the village.

Fish are prepared in a variety of ways. In season they are preferably eaten either boiled or raw-frozen, the latter often dipped in seal or other oil.

The bulk of the salmon (king, dog and silver), whitefish, tom cod, herring and smelt caught during seasonal migration runs is air-dried. Dried fish is preferably eaten after dipping in seal or whitefish oil, but when these oils are not available, they are eaten plain. At Hooper Bay and other Norton Sound villages certain of these fish—silver salmon at Hooper Bay and tom cod and herring at Hooper Bay and other coastal tundra villages—are preferably prepared and eaten as *'poke' fish*, i.e. partially air-dried and stored in seal oil.

Smoked fish, especially king salmon, is relished as a trail food since it is not only very tasty, but easy to carry.

A practice of both the Eskimo and the Yukon-Koyukuk Indians, done less often today than in the past, is the extraction of oil from salmon heads. As described by Sullivan(71) this consists of stringing several fish heads on a stick and keeping them submerged in the river for about two weeks or until they are partially decomposed. On removal they are boiled and as the oil is rendered it is removed. When the rendering process slows down, the heads are first allowed to cool and then squeezed to express more oil. The fish heads are then boiled again and the oil squeezed out again. The cheesy-textured material remaining is eaten. It is in all probability a good source of calcium.

Boiled fresh *fish heads*, especially those of the salmon and whitefish, are highly prized. The cheeks and fat behind the eyes and the soft chewy cartilage are particularly well liked for their very delicate flavor. Occasionally when cooking fresh salmon heads, some of the fresh salmon roe may be added.

Blackfish and *needlefish*, two of the smaller fish species found in shallow tundra waters, are eaten whole, either boiled or raw-frozen. Occasionally blackfish are dried. Blackfish are caught in winter in willow traps placed under the ice and needlefish by both trap and dip netting (see illustration #17).

Eskimos living in the Kuskokwim-Yukon delta hold the blackfish in high regard both because of its flavor and its availability when other foods tend to be scarce. Petroff(15) wrote that this fish "furnishes subsistence to whole settlements (in the Kuskokwim district) where nothing else could be found to sustain life at certain seasons of the year" . . . . that the people who eat blackfish "are in better condition physically when spring approaches than any of their neighbors in regions where it does not exist . . . they being almost exempt from the annual period of starvation preceeding the beginning of the salmon run in the rivers."

Eskimos in the Bethel area, however, claim that dogs fed an exclusive blackfish diet for any length of time will not survive. The reasons are not known.

Blackfish are highly infested with tapeworm, but these are easily destroyed either by boiling or by freezing. Hilliard(72) found that the fish tapeworm was completely destroyed when the fish were held at temperatures not exceeding 18° C. for 48 hours.

Nordinskiold(73) found a similar blackfish, *Dallia delicatissima*, on the Chukchi Peninsula, Siberia, and describes it as a "veritable delicacy, in taste somewhat resembling eel, but finer and more fleshy."

During the early summer salmon run along the Kuskokwim River, the heads of King Salmon sometimes with the liver and pancreas added, are putrefied by burying them in grass-lined ground pits, carefully covered first with grass and then with turf or mud to exclude all air and to protect from the heat of the sun. According to present-day informants, that used for human consumption is putrefied only until the flesh is soft and falls away from the bones easily. This takes 3 to 4 weeks. Only a small amount, that which can be used immediately, is taken out at a time. It is eaten with dried fish. When the material putrefies beyond this point, it is used almost exclusively for dog feed. However, Nelson(45) states that fish heads were kept buried until autumn and that at the time of removal from the pit, the bones had taken on the same consistency as the general mass. This material was kneaded in a wooden tray to form a pasty compound and eaten as a favorite delicacy. He states, however, that the odor is sometimes "too strong, even for many Eskimos." Along the Kuskokwim River this material is called *tip-nuk;* at Hooper Bay *uk-suk*. It does not appear to be used as much as it was in the past.

At Shungnak either dog salmon or sheefish heads are allowed to putrefy only mildly, from one to one and a half weeks only. It is eaten plain and is called *or-ruk*.

When the salmon runs are particularly heavy, the whole fish, usually dog salmon, may be buried for putrefaction. It takes a month or more for the fish to reach the desired stage. At Shungnak such fish are called *caw-suk*, and are either eaten raw or cooked, the latter no more than a momentary plunge into boiling water. Along the Kuskokwim River during the winter the pits are opened and pieces of the frozen mass are cut off as needed. These may be eaten either frozen or after they have been thawed.

Many Eskimos, particularly those from the Kuskokwim tundra, make an *agutuk* mixture using cooked whitefish or ling cod, as follows:

The fresh whitefish or ling cod is boiled. The flesh is then squeezed to force out the liquid. When it is dry enough to flake, it is added to a whipped fat mixture made of hydrogenated fat, edible beef or caribou tallow whipped with seal or whitefish oil. To this mixture is also added sugar to taste and either a mixture of crushed cloudberries and low-bush cranberries, a mixture of berries and sourdock, or "mashu" cooked and chopped very fine.

Here is a "typical" recipe:

Whitefish (9–10″ long)—boil, squeeze the flesh dry and flake
Hydrogenated fat—6 Tbsp.
Seal oil or whitefish oil—1½ cups
Sugar—½ cup
Cloudberries—6 cups

Fish Roe: Roe from various fish are used in a variety of ways. Herring, salmon, ling cod, tom cod, pike and whitefish roe are considered the most desirable by the Eskimo. It may be eaten fresh raw or cooked in season, or air dried or otherwise prepared for off-season use. An old practice of the Kuskokwim River Eskimos, who used to have their spring and summer camps in the Alaska Range foothills in the vicinity of the Kisaralik River, was as follows: Birch bark baskets, filled with salmon roe, were placed in cold ground pits, covered first with a layer of grass and then turf and mud to provide a tight seal. They were left undisturbed until the following spring when the people returned to camp. Apparently only small amounts could be eaten at a time for the taste and odor were very strong.

At Napaskiak, salmon roe, preferably that from the King Salmon, is laid out on logs and turned occasionally to facilitate partial drying. This usually takes about three days if the weather is good. The dried product is then put into a barrel or flour sack (formerly the sacks were made of salmon skins), and stored in a cool place, usually the family food cache. The roe, which starts to ferment within five days, is poked down with a stick two or three times. When needed, the hard, crusty surface is scraped off, and the softer material underneath is used. This material is called *m'look* and is used in the following ways:

1) To make "*muk-muk*". This is prepared by mashing and whipping *m'look* thoroughly and then adding sugar to taste and about four quarts or more of cloudberries. The stronger the *m'look*, the more berries required. Seal oil may be added in small amounts if desired. "Mouse-nuts," thoroughly washed, cooked and finely chopped, may be substituted for the berries.

2) As a soup thickener, in which case a small amount of *m'look* is mashed and added to the cooking broth, usually that in which rabbit or duck has been cooked, and stirred until it thick-

ens. Either chopped "mouse nuts" or *tayahuk* are added and the whole salted to taste.

3) To make *Kay-u-suk*, a soup, a small piece of fish or blackfish heads are boiled in a large amount of water and after removing the bones a piece of hard, crusty *m'look* mixed with a small amount of the broth is stirred into the pot. Then one or more of the following is added: chopped "mouse nuts", *tayahuk*, chopped tundra lichens (a large black fungus, almost plate sized, or small white hollow lichens about 2 to 2½ inches long). If lichens are used, some oil must also be added.

4) Sometimes dry fish is dipped into a small amount of the *m'look.*

Some of the Kuskokwim River Eskimos say *m'look* is a good food to have on hand in times of food shortage, for the taste is so strong that it gives one of sense of satiety.

Fish roe is also used in making soups. At Napaskiak a spring soup is made using fresh smelt roe and chopped willow catkins; a summer soup is made using fresh salmon roe and chopped, young, tender willow leaves.

Along the Kuskokwim River fresh or dry King Salmon roe is often used in making *agutuk*. The following is a typical recipe:

1 cup	mashed fresh salmon roe	1 cup	sugar
2 tbsp	water	4 cups	cloudberries
2 cups	seal oil	2 cups	crowberries

At Shungnak fish roe, especially that from whitefish and sheefish, is often eaten as *kwak*. In the spring season it is thawed and eaten raw.

Fresh pike, whitefish or sheefish roe, is often used with low-bush cranberries. Here is a typical recipe:

3 sacs	roe, mashed	3 tbsp	seal or whitefish oil
2 cups	very ripe low bush cranberries	3 tbsp	sugar

These ingredients are stirred or whipped to make a fluffy mixture, which must be eaten immediately after preparation, since the mixture does not hold its shape or consistency. On the tundra this mixture is called "cranberry creme" or *kapuktuk*. Along the Kobuk River a small amount of baking soda is usually added, and the mixture is called *e-tu-polik*. Koyukuk River Indians call the mixture *unjah*.

Along the Noatak and Kobuk Rivers, dog salmon and white-fish roe are prepared by cutting the fish so that the body cavity containing the liver, entrails and roe is left intact. The fish are hung to air-dry for about a month. This is done fairly late during the fish run when the weather is cool. Roe prepared this way is used for human food until it gets too "tipoxsee", i.e. smelly or stinky; in which case it is used exclusively for dog feed. Dog salmon roe prepared in this way is called *ah-nah-lik;* whitefish roe *ah-mah-jak.*

In this same area intact sacs of dog salmon roe are also hung on racks to air dry, usually for a month if the weather is not too hot. These can be eaten as long as they last, again provided they do not get too "tipoxsee". The roe from salmon just about ready to lay their eggs is considered a delicacy by some of the northern Eskimos. It has a chewy texture and is called *mupcooleetuk.* In contrast, the roe from early caught salmon, i.e. that from fish which has just entered the river from the ocean, is juicy or watery. This roe is called *cupseeruk*, and is rated only second best.

Salmon, tom cod, herring and whitefish roe are often completely air-dried in the sac and later used in soups or soaked in a small amount of water and used in berry mixtures or eaten uncooked with seal oil. However, most dried roe is used in the preparation of dog feed.

At Hooper Bay and other Bering Sea coastal villages and summer camps, fresh-laid herring roe, where obtainable, is collected on seaweed or braided grass and air-dried. When needed for use, it is soaked in water. If collected on seaweed, the seaweed is eaten too. It is usually added to soup, but sometimes it is eaten alone with seal oil.

Fish Livers: The tundra Eskimos of the Kuskokwim River basin make a fish liver creme called *tingugtluk*, using most commonly the livers of whitefish, tom cod or ling cod. A typical recipe is:

10–20	whitefish livers, cooked and mashed
3–4 cups	berries (cloudberries, cranberries, or crowberries or a combination of these)
½–1 cup	sugar
2 tbsp–½ cup	whitefish oil

Sometimes the sugar and oil are added separately at serving time according to individual tastes.

At Hooper Bay tom cod livers are cooked and mashed and mixed with an equal amount of crowberries. This is called *tungnuchak.*

In the Kotzebue area trout livers are used in a mixture called *tingulik.* The trout livers are gently simmered in water to cover; the oil is scooped off carefully and reserved, the livers removed, mashed thoroughly, and mixed with the oil and berries.

At Unalakleet in times past, and probably in other areas where tom cods were available, the Eskimos used to simmer tom cod livers in a small amount of water. The oil was carefully removed and used in infant feeding. Many of the older women from several of the tundra villages report that in times past fresh fish liver, prechewed by the mother, was one of the first solid foods added to the infant's diet.

AGUTUK RECIPES (Eskimo Ice Cream)

#1	1 cup	Beef or caribou tallow or moose fat
	½–1 cup	Seal oil (sometimes ugruk oil)
	½ cup, more or less	Water or snow
	10–12 cups	Cloudberries
	0–2 cups	Sugar
#2	2 cups	Beef tallow
	1 cup	Seal oil
	½ cup	Sugar
	5 cups	Cooked and chopped "mouse nuts"
#3	1 pc. 7"x5"x1"	Caribou fat
	1 cup	Seal oil
	12 cups	Crowberries
	1 cup	Sugar
#4	1 pc. 4"x1"x1"	Moose fat
	½ cup	Hydrogenated fat
	½ cup	Seal oil
	1 cup	Sugar
	4 cups	Low bush cranberries
	2 cups	Crowberries
#5	1 cup	Beef tallow
	½ cup	Hydrogenated fat
	1 cup	Seal oil
	4 cups	Sourdock, cooked
	4 cups	Low-bush cranberries
	1 cup	Sugar
#6	1¼ cups	Beef or caribou tallow
	1 cup	Seal oil
	1 cup	Sugar
	½ cup	Water
	5 cups	Sourdock, cooked
	6 cups	Crowberries
	1 cup	Raisins, softened
	½ pound	Apples, dry, cooked

	2 cups	Reindeer fat
	½ cup	Ugruk oil
#7	½ cup	Water
	½ cup	Milk, evaporated
	5 cups	Sourdock, cooked
	5 tbsp.	Sugar

Makuk (Hooper Bay) and *pah-wun-a-kuk-kuk* (St. Lawrence Island) are mixtures of berries, mashed salmon roe, and seal oil with flour sometimes used as a thickening agent.

At Hooper Bay, sphagnum moss formerly was used as a food in a dish called *poo-ee-yah*. Seal oil was poured over the moss, which was then set aside in a cold place for about one month or until the mixture became very sticky. Then crowberries and water were added. This mixture had to be eaten right away.

BLOOD SOUPS (Hooper Bay)

(Approximate recipe proportions)

Oknuk #1

4–12 cups	tayahuk
1–2 cups	seal blood
¼–1 cup	seal oil
½–1 gal.	water or cooking broth

Oknuk #2

1½ sacs	ling cod roe, fresh
16 cups	"mouse nuts"
1 cup	seal oil
4 cups	seal blood
4 qts.	water or cooking broth

Oknuk #3

3 cups	tom cod roe, dry
15 cups	"mouse nuts"
2 cups	seal blood
½ cup	seal oil
1½ gal	water or cooking broth

	2 cups	Reindeer fat
	½ cup	Ugruk oil
#7	½ cup	Water
	½ cup	Milk, evaporated
	5 cups	Sourdock, cooked
	5 tbsp.	Sugar

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4–12 cups	tayahuk
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1½ sacs	ling cod roe, fresh
16 cups	"mouse nuts"
1 cup	seal oil
4 cups	seal blood
4 qts.	water or cooking broth

Oknuk #3

3 cups	tom cod roe, dry
15 cups	"mouse nuts"
2 cups	seal blood
½ cup	seal oil
1½ gal	water or cooking broth

PRESENT DAY FOOD QUEST ACTIVITY CHARTS

By Village

CHART I: ALLAKAKET AND HUSLIA

(Northcentral Athapascan Indian)

Season	Foods Available	Remarks
FALL (September-October)	Moose	The first official hunting season for moose opens in September and every hunter in the village tries to get his quota of one at this time, since the meat is usually in prime condition.
	Sheefish	Sheefish are available only for a few days at most in September during the upriver migration. One or two families may get about 100 fish, but most average about 30. The average weight is about 10 pounds per fish.
	Whitefish	Whitefish are usually plentiful in October. They are caught by netting through the ice. A good catch for the month at Allakaket is about 100 fish per family averaging eight pounds each. In 1958 the average was only 40 fish per family.
	Grayling	There is about a two week run of grayling in October at Allakaket and the average catch is about 150 pounds of fish per family.
WINTER (November thru April)	Ptarmigan	Ptarmigan are hunted from about the middle of November through March, with most families snaring 1 to 2 every other day, although some years there are very few. March is the best month. About every third year ptarmigan are abundant; 1957 was a good year.
	Snowshoe Hare	Rabbits are caught by snaring. These animals used to be abundantly available in the area but they have been scarce for the past six years. The Indians say they were killed off by an epidemic of some kind characterized by diseased livers. At this same time there was a rabies epidemic among foxes and wolves.

Season	Foods Available	Remarks
	Moose	Moose is the most important meat source in the Koyukuk Indian diet. The second official hunting season opens in November but the people do not consider November a good time for moose hunting, because the meat is not at its best for eating. Moose appear to be more plentiful at Huslia than at Allakaket. The skins are used for making winter boots and gloves.
	Caribou	Caribou do not penetrate as far south as Huslia but at one time it was the most important winter food in the Allakaket Indian diet and the fur was especially prized for the making of winter boots, sleeping robes, etc. Caribou came every November into the Alatna River drainage area, usually staying for about a month only, but occasionally all winter. Caribou come into the area now only about once every three years. In 1957 they were plentiful; none came into the area in 1958; only a few in 1962; but they appeared in good numbers again in the winter of 1963-64.
	Mink Marten Otter Lynx Fox	The trapping season for these animals opens about mid-November. Mink and marten are the most readily available and the sale of their furs is an important source of income. In the early days the meat of mink and otter was used as human food but this is no longer a common practice. In 1957 the highest amount—and for one family only—obtained from the sale of mink and marten at Allakaket was $500; three or four families realized $300 to $400 but several made only $30 to $40 for the season. Trapping returns are usually higher at Huslia.
	Ling Cod	At Allakaket ling cod are caught from late November through January using traps made of spruce set under the ice after it is sufficiently set, usually by the end of November. When the first run of fish begins, about 300 fish are taken every two days for about one week, then

Season	Foods Available	Remarks
	Ling Cod, continued	only about 50 every other day for awhile, and then the catch further declines.
	Beaver	Beaver are trapped from about February 1st through March 31st. Beaver pelts are the most important income source for these people. The maximum allowance of 25 per individual trapper is caught most years. When the price is good, 25 skins may average $500 gross income. The meat is a very important food item.
	Muskrats	Muskrats are available in the area and the trapping season opens about January 1st. However, at this time it is usually too cold for trapping—the thermometer sometimes drops to −68° F.—and the price for muskrat skins is now so low that it doesn't warrant the effort required to trap them unless there is a food shortage. Later in the season, when the temperature moderates they are caught and used to enhance the meat supply.
SPRING (May and June)		April and May are not good months for travelling in this area. It is usually too soft under foot and the rivers are not yet open for boat travel.
	Porcupine	Porcupine used to be abundantly available and were used the year round. They were at their fattest and best from about April to August. Twenty-five or more years ago they were very plentiful in the Allakaket area, but apparently at that time some disaster wiped them out. Nowadays only about four or five animals a year are taken for the entire village. There is some indication that during the last year or two they have begun to increase.
	Ducks Geese	Huslia is on the wildfowl route and ducks and geese in limited amounts usually appear on the spring dietary. This village is not located near a major wildfowl nesting area as is Allakaket, so

Season	Foods Available	Remarks
	Ducks, continued	neither the birds nor their eggs are major foods.
	Pike Sucker Whitefish	During the latter part of May there is some fishing for pike, sucker and whitefish, but usually just enough are caught at a time for a meal or two.
	Rhubarb (Polygonum alaskanum)	Wild rhubarb is available in prime edible stage only for about one week during the first part of June. There is not enough available to put up for winter use.
SUMMER (July and August)		During June and early July very few native foods are available. This is the traditional "hungry time" of the past.
	Salmon King Silver Dog	The salmon run begins approximately July 20th. First a few kings and then a few silver salmon are taken, followed by a more prolific run of dog salmon, but the run varies widely from year to year. In a good year at Allakaket the average family expects to catch 500 to 700 salmon, but only during three summers in the past fifteen years has the catch been this good. Most of the salmon is used for human food.
	Black Bear Berries Rose Hips	Black bear are usually hunted during the last part of August. About 20 are taken per year for the entire village at Allakaket. Blueberries and low-bush cranberries are available in moderate amounts in the area. Only small amounts are stored for winter use.
	Wildfowl	Summer has always been the best as well as the traditional time for getting wildfowl and their eggs at Allakaket. A family would average at least 100 or more birds per season. The present take is considerably less than this because wage employment extends well into the fall season.

CHART II: PT. HOPE
(Northern Coastal Eskimo)

Season	Foods Available	Remarks
FALL (September and October)	Wildfowl	Ducks, geese and snowy owls which pass over the village during their southward migration, and to a lesser extent ptarmigan (near Jabbertown), are obtained in moderate numbers at this time.
	Caribou	From September through February the men, usually in parties of 2 to 5, hunt caribou in the hills east of the village. The number taken varies considerably from year to year. For several years prior to 1958 caribou were relatively scarce in the immediate area but since then their numbers have increased.
	Grayling	Since aboriginal times many Point Hope families established fall camps along the Kukpuk River in the Cape Thompson area. Here they fished for grayling, first by pole and net fishing and later by hooking through the ice. Even though the men who obtain summer wage work may not be back in time, and although many families stay in the village because of the beginning of the school year (September), sufficient grayling are still obtained and they constitute a very important fresh food item in the fall diet.
WINTER (November through April)	Caribou	Caribou hunting continues, sporadically, from November through February.
	Seal Ugruk	From about late October or early November—as soon as the shore ice becomes solid enough for safe travel—and continuing throughout the winter, seal and ugruk are hunted in open leads. These animals are one of the most important food animals on present day Point Hope diets. A good hunter may secure 120 or more animals during the season. They serve as food for both dogs and man.

Season	Foods Available	Remarks
	Polar Bear	This animal is hunted sporadically during this season and has always been an important item in the Point Hope economy. Its meat is used for both human and dog food; its fur as a source of cash income. In 1948 about 70 bear were caught; in 1958 about 35; in 1962 only 15. The drastic reduction in the take in recent years is primarily due to the sport hunting of this animal by "outside" hunters—from other parts of Alaska and from the south 48 states. Income from housing and feeding and, to a much lesser extent, from guiding hunters (most guides are from outside the village and use planes) is gradually replacing cash formerly obtained from the sale of the skins.
	Whale Baleen	Throughout March and April priority is given to the assembling and repairing of skin boats (oomiaks), guns and other gear used in hunting the baleen whale. The actual hunt for this animal usually begins in April.
	Beluga	The beluga whale, whose appearance in the area may just precede or occur simultaneously with that of the baleen whale, are hunted whenever there is an enforced curtailment in the pursuit of the larger animal. Only a few beluga are taken each year, and 1 to 5 baleen whale are usually caught.
	Crab	From late February through March a very small species of crab is obtained by jigging through holes in the ice on the south side of the village. Crab is not a major item in the diet.
	Grayling Tom Cod	Fishing for grayling in the Kukpuk River may continue until about mid-November. During January and February, the women and older men gig for tom cods through holes in the ice on the north shore.

Season	Foods Available	Remarks
SPRING (May and June)	Ducks Murres	From early May through June, ducks and murres fly over and around the area (the murres nest at nearby Capes Thompson and Lisbourne). Usually enough are taken to satisfy day to day needs, although some families still store limited supplies for future use.
	Whale Baleen Beluga	Whale hunting continues into the spring season. Almost everyone in the village is occupied in some capacity in relation to it, either as an active hunter or assisting in supplying the needs of the hunter or in transporting and storing the catch. Rainey (7) states that prior to the whaling days of the 1800's the yearly whale catch at Point Hope was 15 to 18. Now as indicated above 1 to 5 is the usual number.
	Seal Ugruk	After whale hunting ceases, the hunting of seal and ugruk is resumed and carried on as long as the shore ice is safe. There is usually excellent hunting of this animal first along the south shore near the village and later near Jabbertown, but occasionally as in 1958 and 1963, the shore ice breaks away early and moves out so fast that very few are taken.
	Walrus	A few walrus may be taken at this time of the year but not in significant numbers nor every year. It appears that this animal no longer hauls up on the beach near Cape Thompson in the sizeable numbers that it did in the past.
SUMMER (July-August)	Wildfowl and Eggs	In July, wildfowl, especially ducks and murres, are hunted and significant amounts may be stored for future use. They are not hunted as assiduously as in the past due to the fact that many of the able-bodied men have already left the village for summer wage work. The men remaining in the village make several trips to Cape Thompson and Cape Lisbourne to gather murre eggs. The Bureau of Indian Affairs (11) estimated the yearly take at about 830 dozen eggs

Season	Foods Available	Remarks
	Wildfowl and Eggs, continued	or approximately 2½ dozen per family. In former times, but rarely today, significant quantities of eggs and young birds were stored for winter use. They were first boiled and then stored in seal oil.
	Caribou	This animal may be hunted at this season especially if, as is often the case, they come down from the hills to the lagoons at the time families happen to be camped nearby.
	Ground Squirrel	Families that still camp for the summer in the Jabbertown area (only one family did so in 1958) easily obtain significant quantities of ground squirrel.
	Whitefish Salmon Trout	There is sporadic fishing for whitefish, salmon and trout as the runs—comparatively small ones—pass close along the south coast near the village.

CHART III: NOATAK
(Northern Interior-Coastal Eskimo)

Season	Foods Available	Remarks
FALL	Caribou Berries Eskimo Potato	By September most families are in the village because of the opening of school. However, the men in small groups establish camps upriver to hunt caribou and the women make all day trips out from the village for berries, and "mashu", the Eskimo potato.
	Trout Grayling Whitefish	Most families who camp upriver as well as those at the village may net trout, grayling and whitefish from the river. Later, as soon as the ice is solid enough to walk on (late October) the older women and occasionally the men go short distances from the village to hook these fish through the ice. An unusual lure used was a small piece of colored, preferably orange, gum drop.
WINTER	Caribou	Hunting for caribou continues as long as they are available within a reasonable distance from the village.
	Fish Trout Whitefish Grayling Suckers	As soon as the ice along the river has frozen sufficiently, the women and the men, too, if they are home, hook fish through the ice. Trout is the most abundant fish and a good fisherman during the run will get as much as two gunnysacks full at a time. Other fish available in lesser amounts are the whitefish, grayling and suckers.
SPRING	Bowhead Whale	A few men may go to Point Hope to participate in the whale hunt. Only limited supplies of whale muktuk are brought back to the village. It is a seasonal treat rather than a regular item on the dietary.
	Rabbits	From the last of April through May, depending on snow and ice conditions,

Season	Foods Available	Remarks
	Rabbits, continued	families leave Noatak—usually by dog-teams—for the coast near Cape Krusenstern, settling mostly at Sealing Point and at Kuluksuk (meaning a place of many rabbits).
	Seal	Seal are hunted in open leads and on ice floes, using either dog team or boat as ice conditions demand.
	Wildfowl and Eggs	Wildfowl, especially ducks and geese, are hunted and later their eggs are gathered from the surrounding nesting area.
SUMMER	Ugruk Beluga Trout Whitefish Blueberries Caribou	By July most of the Noatak families have moved their camps to Sheshaulik and late comers from the village join them there. The men hunt ugruk and the beluga whale; the women prepare the meat and blubber for storage. At the end of the seal and beluga hunt a few families may remain at the camp site to fish for trout and whitefish and to gather blueberries, but by mid-July most families have moved to Kotzebue to trade and to pick up available wage work. By early August many families are already returning to Noatak. The men usually go up river to hunt caribou. Eventually most families scatter to their camps along the Noatak River below and above the village.
	Salmon	Here they net salmon and dry it on racks or otherwise prepare it for later use. Most of the salmon is used for dog feed although if the weather is good for drying fish, they will be used for human food too.

CHART IV: SHUNGNAK
(Northern Interior Eskimo)

Season	Foods Available	Remarks
FALL	Moose	Most families have returned to the village by this time—the women from their fish camps, the men from their summer wage work. According to the Shungnak Eskimos moose have always been present in the upper Kobuk area but never in large numbers—4 to 5 is generally the largest number taken in a year. The area was closed to the hunting of this animal at the time the villages participated in the dietary study (1959–60).
	Porcupine	Porcupine, once plentiful in the area, are now scarce. Only an occasional one is now caught. This animal was at one time an important source of fat.
	Ptarmigan Spruce hens	Ptarmigan and spruce hens are usually available in moderate numbers near the village at this time. They are snared or shot with a .22 rifle.
	"Mashu"	"Mashu", the edible root of ***Hedysarum alpinum***, is usually collected in good quantity from along the river banks and from the innumerable gravel bars in the river. Some years as many as three large gunny sacks full per family are stored for winter use.
	Crowberries Low bush cranberries	Most years from 50 to 100 pounds—sometimes more—of crowberries and low-bush cranberries are collected and stored per family.
	Currants Rose Hips Raspberries	The fruit of the wild currant, rose and raspberry are available in limited amounts. They are usually collected casually during the summer—i.e. they are eaten off the bush.
	Whitefish	During October, whitefish, the last of the migrant fish to descend the Kobuk

Season	Foods Available	Remarks
	Whitefish, continued	River, are obtained by trapping or netting them under the ice. They are available for a limited time only and used fresh.
	Caribou	Caribou strays sometimes drift into the area in September and sizeable herds are usually in residence in the general area by October.
WINTER	Caribou	Caribou is the most important winter food in the diet of the Eskimos living in the upper Kobuk River area. Serious hunting of this animal begins in October and continues through April. In the most common migration pattern followed by the caribou they drift south from the Noatak drainage area through passes in the Brooks Range to the headwaters of the Selawik River. Here they stay throughout the winter, leaving just before the ice breakup is imminent. They usually fawn in the Colville River drainage area.
	Ling Cod	Intermittently, from November through about February, ling cod are obtained in moderate quantities by trapping under the river ice. They are used mostly as dog feed although the liver and roe are relished by the people.
	Ptarmigan Spruce hen	In December, ptarmigan and spruce hen, usually abundant in the area, are either snared by the women or shot with a .22 rifle by the men.
	Snowshoe hare	The snowshoe hare, formerly plentiful in the area, has not been seen since 1956.
	Beaver Muskrat	Beaver can be trapped in some areas but at a considerable distance from the village. Muskrats are obtained by trapping or shooting with a .22 rifle. Both of these animals were important late winter foods in aboriginal times, especially for those families who had winter camps favorably located for their ac-

Season	Foods Available	Remarks
	Beaver Muskrat, continued	quisition. They are scarce, however, in the immediate Shungnak area and to obtain significant numbers requires much travel; hence, they are little used now.
SPRING	'Parka' squirrel	Throughout May and into early June most Shungnak families establish temporary camps on high ground near or at best only short distances from the village. During this time ground squirrel may be obtained by trapping, snaring or shooting with a .22 rifle.
	Pike Sucker Ducks Geese	Pike and sucker may be obtained from valley lakes and sloughs; ducks and geese are hunted during migration and later in the season their eggs are obtained from local nesting areas. None of these foods is available in large quantities.
	Sheefish Whitefish Grayling Pickerel	In June, after the ice has gone from the river, sheefish and whitefish—now on their upriver migration—and grayling and pickerel are obtained in variable quantities using seines and gill nets.
	Wild Edible Greens	Late in the season wild edible rhubarb and sourdock are sometimes obtained in quantity and often moderate amounts are stored for winter use.
SUMMER	Dog Salmon	While the dog salmon run starts in June, the greater share of the catch is harvested in July and early August. This fish is one of the most important of the food resources of these people. It is obtained in quantity by seining and gill-netting. The women have the complete responsibility for both the fishing and the subsequent preparation of the catch for storage. Their traditional family camp sites are scattered along the river both above and below the village, occasionally at considerable distance from it. Salmon is used fresh in season but most

Season	Foods Available	Remarks
	Dog Salmon, continued	of the sizeable catch is dried and stored to be used in winter for dog feed. Limited amounts of dog salmon—most often the heads—are buried in ground pits and allowed to putrefy. The resulting cheesy-textured mass is a favorite on early fall diets.
	Blueberries	Blueberries are usually plentiful in the area and most families try to store from 100 to 150 pounds each for winter use.
	Bear Hoary Marmot	At this season of the year an occasional brown or black bear or a hoary marmot may be taken. Fat from the latter animal used to be a prized food but since most of the men now work in the summer for wages (in the mines, etc.) they rarely make the extended hunting trips to the mountains for these animals as they did in the past.
	Cloudberries	Cloudberries, the years when they are available, are eaten fresh in season. They are rarely available in sufficient quantities for storage.

CHART V: SHISHMAREF
(Northern-Coastal Eskimo)

Season	Foods Available	Remarks
FALL	Berries	Crowberries, blueberries, low-bush cranberries and cloudberries are often available in significant quantities from the tundra in the vicinity of the village and from the mainland tundra area also. Crowberries and cloudberries are the favorites and most families store from 50 to 100 pounds or more for winter use.
	"Mouse-nuts"	In times past the Shishmaref people made special trips in the fall of the year to the mainland for "mousenuts" (*piknik*) but this is rarely done today. Early health workers discouraged the practice thinking it was a possible source of disease and illness. This food, however, is thoroughly cooked before eating and is probably safe.
	Wildfowl	Ducks and geese are still hunted on the mainland. Relatively small numbers are stored for winter use. The total take is probably much less than in former years since many of the active hunters are away on summer jobs and do not return to the village until after the birds have left on their southern migration.
	Squirrels	Moderate numbers of both the ground squirrel and flying squirrel are obtained. The furs are used to make parkas and the meat used as food.
WINTER	Seal Polar bear	Sealing is sporadic, depending always on the weather. It begins in November after the shore ice is solid enough for walking and dog-team travel, and continues until the ice goes out sometime in late May or early June Some years one or two polar bear may be caught, sometimes none at all.

Season	Foods Available	Remarks
	Tom cod Flounder Sculpin	Throughout the winter tom cods, flounders or bullheads (sculpins) are caught by the women and older people of both sexes by jigging through ice holes in the inlet and the lagoon in back of the village.
	Rabbits Ptarmigan	Whenever weather permits, the men make mainland trips to hunt rabbits and ptarmigan. They are not found in abundance.
SPRING	Willow (inner bark)	The inner bark of the willow, *Salix alaxensis*, is sometimes collected in late April and early May—at about the time the sap begins to run. The outer bark is carefully cut and removed and the thin inner layer is scraped off with a knife. The Eskimo name for this food is "keeleeyuk" meaning the "scrape". This is a very incidental food collected by the men while hunting on the mainland for
	Rabbits Ptarmigan	rabbits and ptarmigan, but they often bring back limited amounts of all of these foods for the family.
	Ugruk Seal	Ugruk is hunted and captured, usually in good quantities, on the pack ice in late May and June or as long as the pack ice persists and is safe. A good hunter at this time may obtain 12 to 14 ugruk as well as many smaller seal. The meat is either completely air-dried or small quantities may be only partially air-dried and then stored in seal oil. The blubber is cut into small pieces, stuffed into clean seal pokes and stored in the cold. During a good year enough seal and ugruk are caught within a two to three week period to furnish a good share of the entire year's supply of meat and oil. By tradition, young boys 13 to 14 years of age accompany the older hunters at this time. The boy's first catch goes to the oldest man in the camp. Prize young seal skins are carefully cleaned and pegged out on the ground to dry. They are later tanned

Season	Foods Available	Remarks
	Ugruk Seal, continued	and used to make sealskin parkas and pants.
	Geese Ducks	In May wildfowl, now on their northern migration, are hunted but usually the amount taken is enough for immediate daily use only.
	Wildfowl eggs	Later, in June, small quantities of duck and geese eggs, and larger supplies of gull eggs, are collected and used in the daily diet.
	Wild edible greens	Sourdock is the most important of the locally available wild edible greens and it is usually collected in sufficient quantity by most families to store for winter use. These greens are cooked before storage.
		Willow buds and leaves, from the smooth-leaved ground varieties, chiefly *Salix arctica*, are also collected in quantity and stored for winter use. They may be precooked but most often they are left raw and are lightly marinated with seal oil just prior to storage in the cold. This product is called "surrah". Other greens and plant parts used in lesser amounts are *Sedum roseum*, both the leaves (*Ereeaklak*) and the root (*Ekutak*); the leaves of the marsh marigold (*Caltha palustris*); and the flower of the wooly lousewort (*Pedicularis lanata*); the latter, to which a small amount of water is added, and then allowed to sour is called *Nahzakmetak*.
SUMMER	Herring Smelts	A moderate but significant herring run occurs along the coast near Shishmaref. Smelts may also be available but in lesser amounts. Excess fish beyond immediate needs are dried for winter use.
	Salmon	There is a relatively small salmon run in July and limited amounts are also dried for future use.

CHART VI: AKIAK
(Southwest Interior-River Eskimo)

Season	Foods Available	Remarks
FALL (September and October)	Moose	Moose are the most important meat source at this time of the year. Most of the active hunters in the village get one each during the regular hunting season and another when special hunts are allowed.
	Bear	Only a few bear, mostly black but occasionally a grizzly, are caught each year in the Alaska Range foothills. Usually only 2, occasionally as many as 5, are obtained for the entire village.
	Mink Ducks Geese	Mink trapping is only fair in the area but the meat is relished. Ducks and geese are generally available, but usually only enough for immediate needs. They are not stored for winter use to any great extent.
	Plant Food	"Mousenuts" are gathered in moderate amounts. These bits of root and Eriophorum (ssp). seedlings are found in underground caches around tundra lakes and ponds. In the past the Eskimo stored them in tightly sealed unlined ground pits but nowadays they are put in gunny sacks and stored in the shed or other cool place. They are not collected and used in the quantities they formerly were.
WINTER (November thru April)	*Fish* Ling cod Whitefish Sheefish Pike Blackfish	Intermittently throughout the winter limited supplies of fresh ling cod, whitefish, sheefish and pike are caught in willow root traps placed under the river ice. Blackfish are caught in similar but smaller traps placed under the ice in tundra streams and sloughs. These fish provide only occasional meals of the fresh product throughout the long winter season for those remaining in residence at the village. Individuals who still go to spring camp in April obtain considerable quantities of blackfish, most of which is dried for future use.

Season	Foods Available	Remarks
	Meat Beaver Rabbit Ptarmigan Muskrats Geese Ducks Spruce Hens	Beaver are available in February. In 1958, the year diets were collected at this village, only five Akiak men trapped beaver seriously. These men obtained the maximum catch allowed which varied from 10 to 25 animals, depending on the drainage area trapped. The fur is sold; the meat eaten. Rabbits and ptarmigan are snared and used to a very limited extent. Muskrat meat is an important late winter or early spring food for Eskimo families who still establish spring camps out on the tundra. They may also obtain limited numbers of geese and ducks, and spruce hens—but only enough to meet daily family food needs.
SPRING (May and June)	Smelts	Immediately after the ice goes out of the river in May, smelts are obtained in good quantity by dip-netting. Most of the catch is dried and stored for dog feed.
	Salmon	King salmon, which feed on the smelts, are the next on the list of fish obtained in quantity from the river. They are used fresh in season, but the major portion of the catch is dried for future human consumption. Smaller amounts of this fish may be salted, smoked or canned. Most families preserve 25-50 pounds of king salmon roe for human consumption, but the bulk of it is stored in barrels or kegs and used for dog feed.
	Sourdock	Sourdock is no longer stored in quantity as it was formerly. Only a few families gather it to any extent.
	Squirrels	Ground squirrels, the meat of which is relished as human food and the skins for making parkas, are still used in moderate amounts.
	Bear (black or brown)	Only an occasional bear is caught.

Season	Foods Available	Remarks
SUMMER (July-August)	Salmon (Dog, Silver) Whitefish Sheefish	The netting and preparation of dog salmon for future use continues throughout most of July. A smaller run of silver salmon follows, most of which is either salted or dried for winter use. Whitefish and sheefish are obtained in limited amounts, usually by netting or with fish traps.
	Berries	Most years moderate supplies of cloudberries are available from the surrounding tundra—usually from mid to late July. Later in the season low-bush cranberries and crowberries are also obtained. Each family stores from 50 to 200 pounds or more of berries for winter use.
	Seal (meat and oil)	Most families obtain limited amounts of seal meat and from 1 to 2 pokes of seal oil, averaging about 65 pounds each, by cash purchase from Kipnuk and Nunivak Island Eskimos visiting the Bethel area.

CHART VII: NAPASKIAK
(Southwest Interior River-Tundra Eskimo)

Season	Foods Available	Remarks
FALL	Ducks Geese	Ducks and geese continue to be available at least during the early part of the season. Very limited supplies of geese are salted for winter use.
	Moose	Moose are not available near the village but in recent years a few of the young hunters have gone upriver to hunt them during the open season. Only 3 moose were brought back to the village in 1958. Most hunters are unable to finance trips of this kind.
	Whitefish Ling Cod Pike Blackfish	Early in the season whitefish are obtained from tundra lakes and ponds; pike and ling cod are obtained first from neighboring sloughs and after freeze-up from the river. Families which still establish fall camps on the tundra usually get large quantities. Blackfish are available in October.
	Seal and Seal Oil	A few men from the village go sealing at the mouth of the Kuskokwim River, but most Napaskiak families obtain seal meat and oil by purchase from the coastal Eskimos. The usual cost to buyers is $5 to $10 per carcass and $20 to $30 per seal poke (50 to 100 pounds) of oil. An estimated 2000 pounds of meat and oil are purchased yearly (Bureau of Indian Affairs Economic Report) (11).
	Berries	Lowbush cranberries and crowberries are usually available in quantity from this area. They are eaten almost daily in season and moderate amounts, much less than in the past, are stored for winter use. Only about [illegible] to [illegible] of the families establish fall berry and fish camps. The rest depend on what is available in the local area.

Season	Foods Available	Remarks
WINTER	***Fish*** Ling Cod Pike Sheefish Blackfish	Through November and December there is sporadic fishing for ling cod and pike and from November through March for sheefish through the river ice. They are not available in large quantities. From mid-March on blackfish are caught in willow root traps in nearby sloughs and other suitable waterways often in goodly amounts.
	Small Game Mink Rabbit Ptarmigan Muskrats	Mink are trapped and rabbits snared from mid-December on. The yearly estimate of rabbit meat consumed is about 200 pounds for the entire village. Some years there are very few available. The meat of the mink is eaten, the skins sold. The year (1956) Oswalt (75) was in residence the average catch per trapper was 10-15 mink. Ptarmigan and rabbits are usually available and obtained by means of snares from about December through April or May. Muskrats are trapped in early April.
SPRING	Blackfish Whitefish Pike Smelts King Salmon Sheefish	Early in the season blackfish are still obtained from tundra sloughs and ponds, using willow root traps. Relatively small amounts of pike are obtained from sloughs in the neighborhood of the village, and whitefish from tundra lakes and ponds; the latter fish are more important in the diet of those families establishing spring camps on the tundra. In late May, after the ice has gone from the river, smelts ascend the river and considerable quantities are obtained using dip nets. Any excess to immediate needs is dried for winter use, mostly as dog feed. The smelt run is closely followed by the king salmon run (early June). They are usually available in good amounts and obtained with both set and drift nets. Most of the catch is dried although some families do salt moderate amounts. A few sheefish may also be caught in the nets.
	Muskrats	This animal is obtained usually in good quantity in early May by trapping in

Season	Foods Available	Remarks
	Muskrats, continued	in tundra lakes and sloughs. The meat is eaten fresh and any excess beyond immediate needs is dried; the skins are sold.
	Birds and Eggs	Ptarmigan and wildfowl and wildfowl eggs are obtained out on the tundra but are used in considerably lesser quantities than formerly since very few families now establish traditional spring camps (May), although some muskrats and wildfowl are obtained near the village environs.
	Greens	Sourdock (***Rumex artica***) is the most common wild edible green in this area. While many families still gather this green they do so less assiduously than in the past. Only minimal amounts are stored for winter use.
	Seal	A few men still go down river near Eek to hunt seal but the number obtained is small—about 5 to 6.
SUMMER	*Salmon* Dog Red King Silver	Early in the season, both red and dog salmon, but especially the latter, are usually obtained in abundance. Only an occasional king salmon is caught at this time. Later in the season (August) silver salmon are also available in good quantity. All of these fish are used fresh in season but most of them are dried for winter use. A significant portion may also be salted or putrified by burying them in ground pits.
	Pike	Only an occasional pike is taken from the river throughout this season.
	Whitefish	Significant quantities of whitefish are obtained from the Johnson River which enters the Kuskokwim River about 20 miles below the village.
	Greens	Sourdock, willow leaves and other greens are collected in moderate amounts throughout the early part of the season,

Season	Foods Available	Remarks
	Greens, continued	mostly from wet places on the nearby tundra.
	Wildfowl	Ducks and geese are obtainable late in the season, usually in limited quantities and for immediate use only.
	Berries	A number of families still collect moderate quantities of cloudberries, mostly from their spring trapping and camping areas.

CHART VIII: KASIGLUK
(Southwest Tundra Eskimo)

Season	Foods Available	Remarks
FALL	Berries	The harvesting of cloudberries and other berries is continuous throughout the fall.
	Ducks Geese	Most of the wildfowl obtained during the fall of the year are used fresh in season and only moderate amounts are preserved by salting.
	Pike Whitefish	Pike, but primarily whitefish, are available in good quantity at this season of the year, the latter being obtained by dip netting. In the fall the men construct a willow fence across the Willidulli Slough. During the fish run they dip from their boats moored at this fence day and night as long as the run lasts. Most of the fish catch is air-dried. The liver, stomach, intestines, roe and visceral fat are highly prized as human food and used in a variety of mixtures.
WINTER	Pike Whitefish Ling cod Blackfish	Sporadic fishing is continuous throughout the winter season. Pike, whitefish, ling cod and blackfish are obtained in moderate amounts usually in quantities sufficient to satisfy day to day needs only.
	Mink	Mink are trapped, mostly in November, in limited numbers. The meat is used for both human and dog food; the furs are sold.
	Rabbits	Rabbits are caught with snares, mostly in November and December. They are rarely available in significant numbers.
	Willow Ptarmigan	Ptarmigan are caught with snares in winter and early spring, but are not usually available in large numbers, except in an occasional year.

Season	Foods Available	Remarks
SPRING	Whitefish Pike	Pike and whitefish, especially the latter, are obtained in good numbers from the Willidulli Slough that flows through the village; and from neighboring lakes and sloughs, after the ice has gone out in May. Fresh fish are used in season, but the bulk of the catch is dried for the next winter's use. A few families usually stay at the village year round and fish almost continuously for whitefish.
	Salmon	Salmon is not available at the village site, but almost the entire population moves to traditional fish camp sites on the banks of the Kuskokwim River near Bethel. The people leave Kasigluk in May, soon after the ice disappears from the rivers, and do not return to their village until late August or early September. The first salmon to appear are the kings. Considerable quantities are dried and stored for use on winter diets.
	Muskrats	To obtain even limited numbers of this small animal requires much travel in the local tundra area. The meat is eaten fresh and when plentiful moderate supplies are dried for future use.
SUMMER	Salmon Dog Red Silver	The biggest salmon run in the Kuskokwim River is that of the dog salmon in July. Large amounts are dried for winter use. They are the most important dietary item for both humans and dogs in the Kuskokwim River basin. Later in the season more limited runs of red and silver salmon occur.
	Wildfowl	Wildfowl are much less important in the late spring and summer diet of these people than they were in the past. Until recent times large numbers were secured by "rounding up" the immature and molting birds. This practice has now been discontinued.

Season	Foods Available	Remarks
	Berries Cloudberries Low-bush cranberries Crowberries Blueberries	Cloudberries are available in late July. They are not collected in the amounts they formerly were, due chiefly to the fact that few families now establish summer camps for this purpose. The able-bodied men from most families now obtain summer employment at the canneries, at Bethel or wherever they can find it. Their families stay either at the village, or at their fish camps near Bethel or at Bethel itself. Late in the season other berries, particularly crowberries, blueberries and low-bush cranberries are harvested in variable amounts from the tundra in both the Kasigluk and Bethel areas. From 100 to 200 pounds or more are stored for winter use by many families; considerably less by others.

CHART IX: HOOPER BAY
(Southwest-Coastal Eskimo)

Season	Foods Available	Remarks
FALL	Berries	Crowberry and low-bush cranberry are collected in considerable quantity by most families.
	Fish	The annual tom cod run occurs in September and they are usually available in sufficient quantities so that sizeable supplies are either dried or prepared as 'pokefish'. Occasionally, as in 1956, there is no tom cod run; significant amounts of blackfish (from 1000 to 4000 pounds depending on the year) are caught in traps set in the surrounding sloughs or they may be obtained in the Kashunuk area.
	Vegetable	Mouse food or "mousenuts" as they are locally called consisting of the young tender seedlings of native grasses and bits of root from several tundra plants—which the field rodents have stored in underground caches for their own winter use, are often gathered by the women in the late fall. One to two large gunny sacks full per family may be collected and stored. Some years, as in 1957, 1960 and 1961, none were available. "Mousenuts" are most often used as a soup ingredient. A few families still collect moderate amounts of the plant called Tayaluk (*Hippuris vulgaris*) which grows in shallow tundra ponds. The portion gathered is that which protrudes above the ice after freeze-up. They are fairly plentiful in the immediate village environs. They are most commonly used along with dried fish roe as a soup ingredient.
WINTER	Blackfish Needlefish Ling cod Smelts	From November through December the men continue to trap the sloughs for blackfish but usually only enough are taken for a few meals at a time. Also at

Season	Foods Available	Remarks
	Blackfish continued	this time a few of the men may go to the Cottock River, about 20 miles away, for whitefish. These fish obtained by netting under the ice are not always available in significant quantities. From November through March needlefish (sticklebacks and dace) are trapped in certain sloughs in the Hooper Bay—Scammon Bay—Kashunuk area. To obtain them usually necessitates traveling from slough to slough, sometimes considerable distances from the village. One hundred to five hundred pounds per family per year is the usual catch. They are used both as dog and human food. In January and February there is sporadic fishing for ling cod. They are caught with traps under the ice in rivers and lakes, usually at about 20 miles distance from the village. They are not plentiful. Sometimes in April, if shore ice conditions are suitable, there is a tom cod run, sometimes accompanied by smelts. The supply of both varies from year to year.
	Seal	Hunting for seal and ugruk continues intermittently throughout most of the winter. This activity is most productive when it is possible to hunt in open leads between ice floes, from about mid-March until the ice goes out in late May or early June. During the winter of 1956-57, seal hunting was poor due to extremely dangerous shore conditions followed by an unusually early ice "break-up". In 1957-58, however, sealing was considered especially good. The Bureau of Indian Affairs Economic Report (11) listed that year's take for the entire village at 680 seals and 53 ugruk.
	Walrus	A few walrus (only 7 in 1958) are taken each year.
	Mink	Mink are trapped from "freeze-up" on. The furs are sold and the meat is used mostly for dog food.

Season	Foods Available	Remarks
	Rabbits	Arctic hare are found in limited numbers in the area, probably furnishing at most a total of 100 to 200 pounds of meat per year.
SPRING	Seal	Seal and ugruk hunting continues in the open lanes among the ice floes until the ice goes out of the bay. It may be fairly productive but is totally dependent on shore ice conditions.
	Muskrat Mink	After the ice in the neighboring sloughs and ponds begins to melt muskrat are hunted but they are not always plentiful in the area. A kayak is still needed to get around successfully in this area at this time of the year. The 1958 catch of mink and muskrat was estimated at 2500 animals, or approximately 33 per family.
	Herring	Most years there is a significant herring run in late May or early June; but occasionally there is a year when the run completely bypasses Hooper Bay.
	Salmon King Dog Silver	Next to wildfowl, salmon is the most important food in this area. The kings arrive first, followed by dog salmon and, later in the season by a substantial silver salmon run. Most of the latter are prepared as 'poke fish' and are important on winter diets.
	Clams	Clams are available in June in quantities, up to 20 quarts per family per year, usually sufficient for immediate consumption only.
	Beluga	This animal, called ***cheetak*** at Hooper Bay and ***beluga*** elsewhere, is available either in late May or early June. Only a few are taken each year. The 1958 estimate was 6.
	Wildfowl and their eggs	From late April until about the first of June, various wildfowl, particularly ducks, geese, cranes and swans, arrive in tremendous numbers. Many are just

Season	Foods Available	Remarks
	Wildfowl, continued	passing over on their migration north but large numbers of certain species remain to nest and breed in the area. Brandt (15) lists 54 species of birds nesting in this area with waterfowl the dominant group. Several of these birds and their eggs are important foods in the dietary of the Hooper Bay Eskimo and many families may store moderate amounts for future use—either by salting or drying. The Bureau of Indian Affairs 1958 estimate of the Hooper Bay take was 500 dozen wildfowl eggs and 2310 waterfowl, mostly ducks and geese (11). This amounts to approximately one dozen eggs and 54 birds per person for the entire village.
	Ptarmigan	Ptarmigan also nest in the area and significant numbers are caught.
	Edible greens	Wild edible greens, mostly sourdock but also significant amounts of marsh marigold, are obtained from late May through June. This food is enjoyed fresh in season but a few families still store moderate amounts for winter use.
SUMMER	Whitefish Salmon Silver Dog	Silver and dog salmon are sometimes available in good quantity the first part of July but only if there are favorable north winds. During August there is sporadic fishing for whitefish. They are not available in significant quantities.
	Wildfowl	In past times, the latter part of July was the best time for "rounding up" immature and moulting ducks and geese but this method of obtaining them is no longer practiced. However, there is continued hunting for wildfowl by individual hunters throughout the summer. According to Petroff (13), "the autumn migration of birds passing south begins the latter part of July and only a few of the hardier waterfowl remain by the end of September."

Season	Foods Available	Remarks
	Berries	During late July and continuing on into September a variety of berries are gathered in quantity, sometimes as much as 100 to 300 pounds per family are stored for winter use. The most important berries are the blueberry, the crowberry and the low-bush cranberry.

CHART X: NEWTOK
(Southwest Tundra-Coastal Eskimo)

Season	Foods Available	Remarks
FALL	Muskrat	Considerable numbers of muskrat are caught by most families. Any meat excess to immediate needs is dried; the skins are either sold or used to make parkas.
	Seal	The large bearded seal, called "mukluk" locally, and the spotted seal are occasionally caught at this time of the year, usually in the bay waters near old Keyaluvik. In some years they are obtainable in goodly numbers.
	Tom cod Blackfish	Moderate amounts of tom cod are available. Most of the catch is dried for winter use except for the livers which are used fresh. Throughout September, moderate quantities of blackfish are caught in willowroot baskets in tundra ponds and small streams.
	Berries	Cloudberries, crowberries, blueberries and especially low bush cranberries are collected and used, but generally not in sufficient quantities for storage as the numerous quaking bogs in the general area make gathering them difficult.
WINTER	Blackfish Needlefish	Blackfish and needlefish, especially the latter, are usually obtained intermittently throughout the winter season but in especially good quantities in November and December.
	Seals	The serious hunting of seals starts after Christmas when the men make overnight trips to the coast to obtain them. Seals are most plentiful, however, in April and May at which time the entire family may move to traditional camp sites near old Keyaluvik on the mainland and/or on Nelson Island.

Season	Foods Available	Remarks
SPRING	Seal	If shore ice conditions are satisfactory, sealing at the traditional camp sites may continue well into May. Only an occasional seal is caught after the ice goes out of the Bay.
	Herring Smelt Flounder Sculpins	Herring are usually available in good quantity. The dried or 'poke' herring is one of the most important foods found on the winter dietary. Occasionally, as in 1960, excessively wet weather prevents proper drying of the fish and as much as 50% of the catch may be lost through spoilage. A smelt run sometimes follows the herring run but not every year; there was none in 1957. A relatively small species of flounder is caught with nets at sea and in what is called locally the 'big river', a narrow waterway flowing between Baird Inlet and the sea which separates Nelson Island from the mainland. Some of this fish is eaten fresh but most of it is dried for dog feed. Sculpins, locally called devilfish, are also available in limited supply.
	Wildfowl	Wildfowl, mostly ducks and geese, which nest in the fish camp area, and their eggs are available in significant quantities and are important on the spring dietary. They are not stored to any great extent for winter use.
	Sourdock	Sourdock is available in the general area, and is eaten fresh and cooked; usually only enough is available to satisfy immediate needs.
SUMMER	Herring Flounder	The summer fishing season is much like that of late spring with continued supplies of herring and flounder caught and dried. Large quantities of herring eggs are also dried and used primarily for dog feed.
	Seal Wildfowl Greens Muskrats	Only an occasional seal, a few ducks and geese, sourdock in limited amounts and a few muskrat (August) are available at this season.

THREE FOOD QUEST PATTERNS OF THE PAST

AKIAK

The mountain Eskimo left the village sometime in April or early May for their campsites at the headwaters of the Kisaralik River. Among the animals hunted in this area were beaver, caribou, brown and black bear, ground squirrel and the hoary marmot. The latter two animals were caught in snares, the noose being made of the soft part of the large vein of bird feathers and the cord from the pliable inner bark of the willow.

Trout, mostly Dolly Varden, were hooked through the ice in the several large lakes in the area.

In early June, after the ice had disappeared from rivers and lakes, fish camps were established and here the people fished throughout the summer and early fall, obtaining good quantities of dog and red salmon mostly by trapping. The trap used was similar in structure to that used for blackfish, but much larger. It was made from the inner bark of the spruce. In addition, a few king salmon were speared, and a few Dolly Varden and other trout were caught.

All of these fish were used fresh-cooked in season, but the bulk of the salmon catch was dried for winter use. The dried fish roe were put in birch baskets and buried in 2 foot deep ground pits which were covered securely, first with grass and then with dirt. They were not opened until the following April when the people returned to the mountain at which time the roe were generally used as a soup ingredient.

Sourdock (*kwakchuck*) was collected and used fresh in season, usually with fish broth to make a soup. Moderate amounts were stored for winter use.

On the way back to the village in the fall of the year, "mouse nuts" and berries were usually collected in quantity; the latter were stored in birch bark-lined ground pits, covered securely and left there until freeze-up when sled travel was practical. They were then dug up and taken to the winter headquarters.

At the village site, from late fall and intermittently throughout the winter, limited supplies of whitefish, sheefish or ling cod were taken in traps set under the river ice; pike by hooking through holes in the ice and blackfish in willow root traps set under ice in nearby tundra sloughs and ponds.

Hunting and fishing during fall and winter were much the same as they are today, but, according to my informant, they were pursued much more industriously in the past.

NOATAK

According to our information the present day population is made up of two distinct groups of Eskimo—the Napaktamiut or timber people and the Noatakmiut, or people of the Noatak River. While they now live together in the same village, in the past these two groups lived and hunted somewhat differently.

In winter the Napaktamiut lived in temporary dwellings made of logs covered with a thick layer of spaghnum moss and dirt. A center opening in the roof or a skylight window allowed for the escape of smoke from cooking and heating fires. New houses were built every year. These winter homes were built in areas where it was possible for the family to fish through the ice for trout, grayling and whitefish all winter.

In late winter, about April, the men repaired their sleds or built new ones, using locally available spruce. When repairs were completed, the entire family with most of their worldly possessions travelled to the spring camp site at Sealing Point on Kotzebue Sound. Since the dog teams were small—usually one to five dogs at the most—the women often had to pull the sled with the men pushing from behind.

From their base camp at the Point, the men hunted seals, although occasionally the entire family would camp out on the ice. Their method of preparing a cooking place while at these "ice camps" was to first, lay down a heavy layer of dried spaghnum moss directly on the ice which was then topped with a heavy layer of sand followed by a layer of pebble rock. Sufficient insulation was thus provided to prevent the ice underneath from melting during the cooking period.

After the "ice break-up" in Kotzebue Sound, the families would go by oomaypak (large skin boat) to Sheshaulik—the place for beluga hunting near present day Kotzebue. From this camp the men hunted both ugruk and beluga whale and the women spent long hours drying the meat and preparing the blubber oil and other products for storage.

Wildfowl, rabbits, bird eggs (ducks, geese, gull and murre) and fish were obtained in quantities sufficient for daily use only. Late in the season the women gathered good quantities of berries, mostly cloudberries and blueberries, which they took back to their winter homes.

Near the end of summer or in early fall the people returned to their winter home sites, stored their dried meat, oil and other food supplies in deep, cold ground pits, and then proceeded farther upriver, camping here and there wherever the women could fish for trout, grayling, whitefish and salmon, do some berry picking and hunt for mice caches from which they often secured good quantities of edible roots. Meanwhile, the men, usually in small groups, proceeded toward the mountains to hunt caribou, bear and mountain sheep. Before "freeze-up" the entire family returned to their winter home.

The people who called themselves the Noatakmiut, on the other hand, lived upriver from the Napaktamiut. They did not form a village but lived in scattered campsites along the river or in the surrounding hills where they stayed from before "freeze-up" in the fall until the "ice break-up" the following June. The men hunted in small groups for caribou, bear and mountain sheep or fished through the ice in the numerous lakes and ponds for trout, grayling and whitefish with nets made of caribou or beluga sinew.

After "ice break-up" in June, family groups travelled by skin boats down the Noatak River to Sheshaulik on Kotzebue Sound. Here the men in their kayaks in groups of two or more, hunted the beluga whale. While at their Sheshaulik camp these people also hunted wildfowl and rabbits, gathered the eggs of nesting ducks, geese, gulls and murrees and picked large quantities of berries. They also carried on considerable trade with the Eskimos of Wales, Shishmaref, Diomede and Kobuk who gathered at Kotzebue annually for that purpose.

The Noatakmiut usually remained in the Kotzebue Sound area until just before "freeze-up" was imminent. Since the river was low at this time of the year the return trip upriver was often very arduous. They sometimes had to harness their dogs, let them run along the shore and help pull the boats over the shallows.

SHUNGNAK

In late May or early June, as soon as the ice began to move out of the Kobuk River, the people loaded their skin boats with members of the family, supplies of jade and the skins of caribou, lynx, land otter, fox and beaver (obtained during the winter hunting and trapping or by trade with the Koyukuk Indians) and travelled down river to Kotzebue, often right behind the moving river ice. Here they spent part of the summer trading their goods in exchange for seal oil, ugruk hides and rawhide rope, ivory, hunting gear and such other trade goods as were available. Some of the men also hunted ugruk in Kotzebue Sound.

Most of the people returned to the upper Kobuk area by mid summer, scattering to their family fish camp sites all along the river. Then as now the women had the major responsibility for securing and preparing the dog salmon catch for winter use.

The men, either singly or, preferably, in small groups, hunted the neighboring hills and mountains for a variety of animals, particularly ground squirrels, bears, mountain sheep and marmots. They also hunted in the upper Noatak River drainage area for caribou and marmots (*asiksikpuk*) but on occasion they roamed much farther north to Anaktuvuk Pass and even farther to the east into Canada.

Late in the fall the men returned to the Kobuk area, usually in time to obtain whitefish and sheefish. Netting and spearing were the usual techniques used, the latter method facilitated by damming shallow portions of the river with cottonwood trees.

Ptarmigan, spruce hens, ducks, geese and, in some years, snowy owls were also obtained at this time of the year.

Earlier as well as now these people depended primarily on caribou for their food supply during the winter months. In an open winter with little snow, the caribou herds would wander over large areas in their search for food. The hunter and his family would follow the migration routes changing camp when necessary. When the snowfall was heavy, small herds became stranded or otherwise separated from the main herd and confined to a rather circumscribed feeding area, making it possible for families to establish more permanent camps where they often remained until spring. Sometimes hunting parties, and family groups too, would range over an area of 50 miles or more; frequently they travelled much farther in search of moose and other game. Caribou, however, provided not only their main winter food supply but also the source of material for making tents, sleeping bags and winter clothing.

Present day Kobuk—about five miles upriver from Shungnak—was the traditional winter campsite for many of these people. The population fluctuated considerably during the season; at times it might be as high as 200 or more. Most of the trading with the Koyukuk Indians took place here, although it was by no means unusual for the Kobuk Eskimos to travel north to Anaktuvuk, east to the Yukon Territory, Canada, and southeast to the Koyukuk Indian camps. One of the present day village elders spent several years of his young adulthood among the Koyukuk Indians.

The Kobuk Eskimo was the middleman between the coastal Eskimo and the Indians. The older people of present day Allakaket, an Athapascan Indian village on the Koyukuk River, still remember that seal oil, obtained in these trades, was a regular part of their diet.

Since much of the Kobuk campsite flooded in the spring when the ice went out of the river (May), small groups of related families established temporary camps on higher ground in the same general area. At this time they subsisted on the remains of their winter food stores supplemented by fresh wildfowl—now on their way north—and muskrat which was plentiful in some locations.

In early June, sheefish and whitefish were available in quantity provided there was enough melt-off from the winter snows to cause the river to rise significantly. If the rise was not sufficient the fish were slow to migrate upriver and by then many families had already left for their summer sojourn at Kotzebue.

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